

## **Historic, Archive Document**

Do not assume content reflects current scientific knowledge, policies, or practices.



A455.5  
F762

# DEER BROWSE PLANTS of SOUTHERN FORESTS

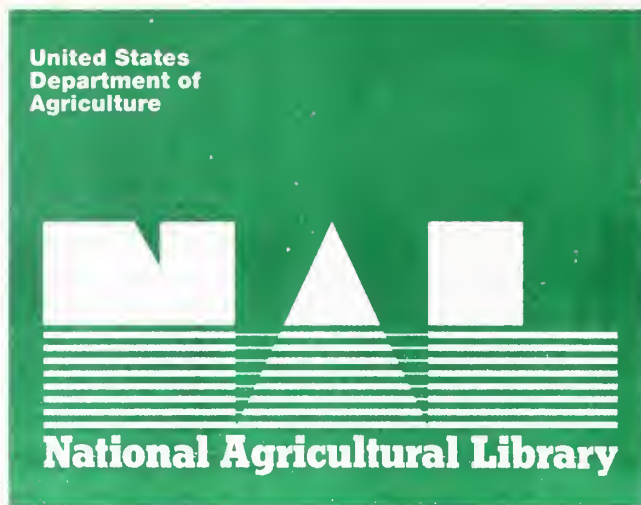
SOUTHERN AND SOUTHEASTERN FOREST EXPERIMENT STATIONS  
FOREST SERVICE, U. S. DEPARTMENT OF AGRICULTURE  
in cooperation with the  
FOREST GAME RESEARCH COMMITTEE  
of the  
SOUTHEASTERN SECTION OF THE WILDLIFE SOCIETY

1961

This I  
the Southe.

Dr. C.  
of Sport F  
Georgia, as  
plan and gu

E



: of

eau  
nta,  
: to

ife,

Hewlette S. Crawford, Jr., Southern Forest Experiment Station,  
Harrison, Arkansas.

Leonard E. Foote, Wildlife Management Institute, Marietta,  
Georgia.

Lowell K. Halls, Southern Forest Experiment Station, Nacogdoches,  
Texas.

Burd S. McGinnes, Cooperative Wildlife Research Unit, Virginia  
Polytechnic Institute, Blacksburg, Virginia.

Thomas H. Ripley, Southeastern Forest Experiment Station, Ashe-  
ville, North Carolina.

Donald D. Strode, North Carolina National Forests, Asheville,  
North Carolina.

Detailed supervision and final editing were the responsibility of Halls and  
Ripley.

Thirty-one specialists contributed the papers on individual species. They,  
together with the organizations they represent, are acknowledged at the  
beginning of each paper. Because their contributions represent published  
papers, it is urged that these authors be cited specifically when references  
to individual species are made. For example:

Goodrum, P. D.

1961. Greenbriers, *Smilax* spp. Deer browse plants of southern  
forests, pp. 62-67, illus. U. S. Forest Serv. South. and Southeast.  
Forest Expt. Stas.

For general reference the following citation is recommended:

Halls, L. K., and Ripley, T. H. (Editors)

1961. Deer browse plants of southern forests. U. S. Forest  
Serv. South. and Southeast. Forest Expt. Stas., 78 pp., illus.

H-53  
2-22

# **DEER BROWSE PLANTS** **of** **SOUTHERN FORESTS**

Editors

*Lowell K. Halls*

*Southern Forest Experiment Station*

*Thomas H. Ripley*

*Southeastern Forest Experiment Station*

U.S. DEPARTMENT OF AGRICULTURE  
NATIONAL AGRICULTURAL LIBRARY

APR 30 1997

CATALOGING PREP.

Published by the  
**SOUTHERN AND SOUTHEASTERN FOREST EXPERIMENT STATIONS**  
**FOREST SERVICE, U. S. DEPARTMENT OF AGRICULTURE**  
in cooperation with the  
**FOREST GAME RESEARCH COMMITTEE**  
of the  
**SOUTHEASTERN SECTION OF THE WILDLIFE SOCIETY**

1961

# CONTENTS

	Page
Introduction. Howard A. Miller .....	1
<i>Acer rubrum</i> , red maple. A. B. Massey .....	2
<i>Callicarpa americana</i> , American beautyberry. Daniel W. Lay .....	4
<i>Campsis radicans</i> , trumpet-creeper. Leslie Glasgow and Bryant Bateman .....	6
<i>Cephalanthus occidentalis</i> , common buttonbush. Stephen L. Beckwith .....	8
<i>Chionanthus virginicus</i> , fringetree. Phil D. Goodrum and Lowell K. Halls .....	10
<i>Clethra alnifolia</i> , sweet pepperbush. Robert Kral .....	12
<i>Cliftonia monophylla</i> , buckwheat-tree. Richard E. Eichhorn .....	14
<i>Cornus florida</i> , flowering dogwood. Frank M. Johnson .....	16
<i>Crataegus</i> spp., hawthorn. Paul A. Shrauder .....	18
<i>Cyrilla racemiflora</i> , swamp cyrilla. Lewis K. Jeter .....	20
<i>Euonymus americanus</i> , strawberry-bush. William H. Adams, Jr. ....	2
<i>Gelsemium sempervirens</i> , yellow jessamine. Roger Rich .....	24
<i>Hydrangea arborescens</i> , smooth hydrangea. Malcolm Edwards .....	26
<i>Ilex</i> spp., hollies. ....	28
<i>Ilex vomitoria</i> , yaupon. Daniel W. Lay .....	28
<i>Ilex cassine</i> , dahoon; <i>I. coriacea</i> , large gallberry; and <i>I. decidua</i> , possumhaw. Alfred L. Johnson .....	30
<i>Itea virginica</i> , Virginia sweetspire. Richard F. Harlow .....	32
<i>Juniperus virginiana</i> , eastern redcedar. Hewlette S. Crawford, Jr. ....	34
<i>Liriodendron tulipifera</i> , yellow-poplar. Thomas H. Hooper and Frances X. Leuth .....	36
<i>Lonicera japonica</i> , Japanese honeysuckle. Lowell K. Halls and Phil D. Goodrum .....	38
<i>Magnolia virginiana</i> , sweetbay. Robert Kral .....	40
<i>Nyssa sylvatica</i> , blackgum. William H. Moore .....	42
<i>Oxydendrum arboreum</i> , sourwood. A. Randolph Shields .....	44
<i>Persea borbonia</i> , redbay. Phil D. Goodrum .....	46
<i>Prunus serotina</i> , black cherry. Harold Alexander .....	48
<i>Pyrularia pubera</i> , buffalo-nut. A. B. Massey .....	50
<i>Quercus</i> spp., oaks. ....	52
<i>Quercus alba</i> , white oak; <i>Q. laurifolia</i> , laurel oak; <i>Q. nigra</i> , black oak; and <i>Q. phellos</i> , water oak. Jack O. Collins and Robert E. Murry .....	53
<i>Rhododendron maximum</i> , rosebay rhododendron. A. B. Massey .....	54
<i>Rubus</i> spp., blackberry, raspberry, and dewberry. Dwight M. Moore .....	56
<i>Sambucus canadensis</i> , American elder. Donald J. Hankla .....	58
<i>Sassafras albidum</i> , sassafras. Robert G. Leonard .....	60
<i>Smilax</i> spp., greenbriers. Phil D. Goodrum .....	62
<i>Smilax bona-nox</i> , saw greenbrier .....	63
<i>Smilax glauca</i> , cat greenbrier .....	64
<i>Smilax laurifolia</i> , laurel greenbrier .....	65
<i>Smilax rotundifolia</i> , common greenbrier .....	66
<i>Smilax smallii</i> , lanceleaf greenbrier .....	67
<i>Symplocos tinctoria</i> , common sweetleaf. Dan Speake .....	68
<i>Vaccinium</i> spp., blueberries. Edward E. Dale, Jr. ....	70
<i>Vaccinium stamineum</i> , common deerberry .....	71
<i>Vaccinium arboreum</i> , tree sparkleberry; <i>V. myrsinites</i> , ground blueberry; and <i>V. vacillans</i> , dryland blueberry .....	72
<i>Viburnum</i> spp., viburnum; <i>V. acerifolium</i> , maple viburnum. Herman L. Holbrook .....	74
<i>Viburnum alnifolium</i> , hobblebush. ....	75
<i>Viburnum cassinoides</i> , witherod; <i>V. dentatum</i> , southern arrowwood .....	76
<i>Vitis aestivalis</i> , summer grape. A. B. Massey .....	77
Taxonomic references .....	78



# INTRODUCTION

The white-tailed deer, one of this country's most popular forest game species, is essentially a browsing ruminant. Its diet is chiefly tender shoots, twigs, and leaves, a wide assortment of herbaceous foodstuffs, mast, and certain fruits. Browse, by far, makes up the bulk of its diet.

This paper offers land managers information about some of the more important deer browse plants of southern forests. Authors were chosen for their knowledge of each species or group of species.

The species described herein should not be considered as a comprehensive list of preferred deer browse plants. Lack of information and space limitation prevented inclusion of many locally important species. Those included, however, are well distributed in southern forests and will be utilized when deer are present.

Plant descriptions contain information as to where species are found, normal growth habit, seasonal preferences by deer, parts taken, and tolerance to browsing. Also included are suggestions for increasing browse production.

In the present state of knowledge, consistency in presentation could not always be attained. For example, there are utilization data on the more intensively studied plants, generalizations on some, and no information on others. The same is true of forage quality; even where nutritional values have been determined, variations in techniques of analysis and collection limit comparisons among species. Clearly, all these plants, with others, merit detailed and systematic study. This publication will have been worth while if it does nothing more than stimulate a quest for knowledge that will improve the management of deer and their forest habitat.

The ability of a given area to support a healthy deer herd is determined largely by the average amount of palatable and available browse. Food, more often than water and cover, is the limiting factor. An adult 100-pound deer requires 4 or 5 pounds (air-dry weight) of food daily. The range should con-

tain a variety of plants that will provide a year-round supply within the herd's home territory of slightly more than a square mile. For practical management as deer range, forests must produce annually at least 350 pounds of available forage per acre. Of this amount at least 20 percent should be available during winter. Superabundance of summer foods will not offset winter shortages.

Condition of the plant influences its use by deer. Browse on slow-growing, suppressed stems is tougher and less palatable than on fast-growing sprouts. Thrifty plants can withstand repeated browsing and still renew foliage, whereas stunted plants are rarely able to extend new growth once they are browsed. Browse borne higher than 5 feet is not available.

Southern forests are capable of supporting sufficient deer to satisfy a large hunting demand. Though various factors are important, excessive timber stand density is mainly responsible for low forage production and correspondingly sparse deer populations.

Habitat can be bettered by accelerated removal of poor growing stock in hardwood types, either through commercial sales or deadening of unmerchantable stems, by periodic thinnings in both pine and hardwood types, and, in the Coastal Plain, by intelligent use of fire.

There is no one set of rules to insure a reasonable balance between deer and forest. Although some guides are broadly applicable, specific circumstances require specific consideration. Proper management can be achieved only through a knowledge of the attributes and shortcomings, requirements for light, space, and nutrients, and acceptable use of the main deer browse plants. It is hoped that this publication will help interested persons to become better acquainted with the plants on which the southern deer herds are most dependent.

HOWARD A. MILLER

Southern Region, U. S. Forest Service,  
Atlanta, Georgia.

# RED MAPLE

*Acer rubrum* L.

A. B. Massey

*Virginia Polytechnic Institute  
Blacksburg, Virginia*

This shade-tolerant tree thrives in moist to wet soils in broadleaf forests and swamps. It is short-lived, grows rapidly, and is easily wounded by fire. Once injured, it soon starts to decay. Reproduction is mostly by seed, but it sprouts vigorously if cut or burned.

Deer browse the seedlings, branches of young trees, and stump sprouts, mainly during fall and winter. Though it is variously accepted, the forage is usually rated as medium to high in palatability, and the abundance and widespread occurrence of red maple make it, potentially if not always actually, a main source of forage for whitetails. From late fall to early spring, as much as 40 percent of available forage may be taken on northern deer range. In the South 20 percent of the available forage may be eaten. It sustains heavy browsing;

in fact, browsing usually stimulates growth of lateral branches.

Leaves and twigs contain 3 to 6 percent crude protein, 1 to 6 percent ether extract, 2 to 3 percent ash, 28 to 37 percent crude fiber, and 56 to 65 percent nitrogen-free extract. In southern coastal regions during spring, mineral content was 0.17 percent phosphorus, 0.65 percent calcium, 0.14 p.p.m. cobalt, 486.0 p.p.m. manganese, and 9.0 p.p.m. copper.

Cattle browse it in spring and summer. Elk and moose, black bear, and beaver utilize twigs and leaves. The seeds, flowers, and buds are used by many birds and small animals.

Its red twigs and brilliant red autumn leaves give it value as an ornamental. The wood is sold to pulp mills and occasionally sawn into lumber.

## ALSO CALLED

Carolina red maple, scarlet maple, soft maple, swamp maple, water maple, white maple.





Medium-sized tree averaging 50 to 70 feet tall.

**LEAVES** deciduous, opposite, light green on upper surface and silvery beneath. Yellow, orange, or red in autumn. Length 2 to 6 inches.

**FRUIT** a double samara, space between wings acute. Red when young. Matures March to June.

**FLOWERS** red to yellowish-green in clusters, appearing before leaves in March to May. Flower buds red, glabrous, clustered at nodes of twigs.

**BARK** smooth, mottled light gray, becomes rough. Narrow strips peel off old trees.



**TWIGS** red, leaf scar V-shaped, 3 bundle scars.

# AMERICAN BEAUTYBERRY

*Callicarpa americana* L.

Daniel W. Lay

*Texas Game and Fish Commission*

*Buna, Texas*

Contribution of Federal Aid in Wildlife Restoration Project, Texas W-80-R.

This shade-tolerant shrub grows under many conditions. It is common beneath full stands of pine, particularly where fire or heavy browsing has reduced other woody plants. It does best when the overstory is high and diminishes when the understory is dense. Though its leaves may wilt during droughts, it can persist on very dry sites, such as those producing scrub post oaks. Reproduction is by seeds, which are distributed by birds and mammals of many kinds.

Deer and cattle compete for the leaves and twigs during the growing season and occasionally in early winter. Under moderate deer pressure about one-fourth of the available leaves and twigs were eaten on an area in east Texas. Under heavy pressure from deer and cattle more than half of the current growth was used. With six years of moderate deer pressure in a fully stocked pine forest, green browse production declined from 21 to 6 pounds per acre. On more open forest sites the species

may be able to withstand 40 percent annual utilization, but the optimum is somewhat less.

The fruit is relished by deer. Stomach analyses in east Texas disclosed heavy use in late November after leaf fall. Seeds were found in 173 of 1,043 groups of deer pellets collected from July to March. The fresh fruit was about 80 percent water, 10 percent pulp, and 10 percent seed. There were approximately 30 fruits per average cluster and 7,322 per pound. Fruit production was nearly one-quarter pound per plant (4 feet tall).

Crude protein content of leaves and twigs in east Texas ranged from 18 percent in spring to 8 percent in fall; on burned range the respective amounts were 22 and 11 percent. Phosphoric acid content varied from 0.45 in spring to 0.18 in fall on unburned range and 0.74 to 0.21 percent with burning.

American beautyberry offers no competition to commercial timber management.

## ALSO CALLED

Spanish mulberry, French mulberry, sourbush.



A much-branched shrub commonly 2 to 8 feet tall.

**LEAVES** deciduous, white pubescent below, soft-textured, aromatic, 3 to 9 inches long, 1.5 to 5 inches wide.

**FLOWERS** small, bluish, clustered in leaf axils. June to November.



**FRUIT** a purple berry-like drupe with 4 seeds, each about 0.03 inch long. Drupe matures August to November, persists to January.



**TWIGS** round or 4-sided, densely hairy.





# TRUMPET-CREEPER

*Campsis radicans* (L.) Seem.

Leslie Glasgow and Bryant Bateman

Louisiana State University  
Baton Rouge, Louisiana

Trumpet-creeper is widely distributed, growing best on open sites and rich, alluvial soils that are moist but well drained. It is absent on flooded sites.

It is easily confused with pepper-vine, *Ampelopsis arborea* (L.) Koehne, but the latter has bi- or tripinnate leaves, flowers borne in panicles, and 2- to 4-seeded berries.

Very dense stands are found in the Mississippi Delta. A residual source exists in dense forests and if the stands are opened very lush growth is produced within one season. When Delta land is cleared, solid stands usually develop in one or two years.

When it appears along fence rows, on aban-

doned fields, and in open forests, trumpet-creeper is generally available to deer. In dense or tall timber stands, it decreases in abundance or climbs out of reach.

New growth is browsed heavily by cattle and deer during the spring and summer. As the stems harden, utilization decreases and there is little browsing during winter. It provides dense cover for deer and rabbits and, in high timber, for squirrels.

It is often a serious nuisance in timber management. Intensive bulldozing or cultivation reduces the density, but burning or light disturbance of the soil merely causes prolific sprouting.

## ALSO CALLED

Trumpet-flower, cow-itch, trumpet-vine, devil's shoestring, fox-glove vine.

## TRUMPET-CREEPER

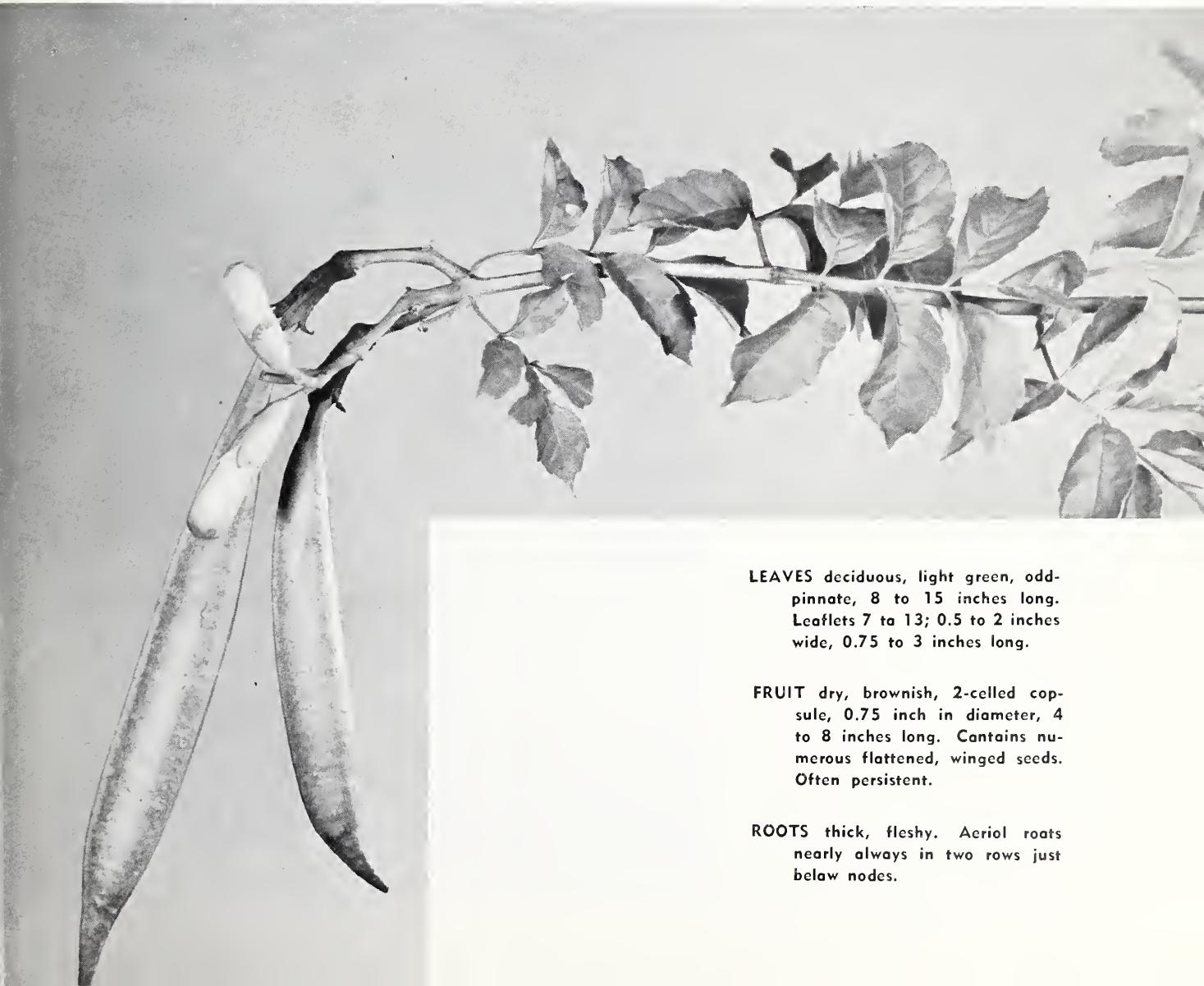
7



Prostrate or climbing vine that occasionally assumes a shrubby form.

**FLOWERS** reddish-brown in terminal cluster. Tube 2 to 3.5 inches long. June to September.

**TWIGS** with opposite leaf scars, bundle scars; arranged in almost closed ring.



**LEAVES** deciduous, light green, odd-pinnate, 8 to 15 inches long. Leaflets 7 to 13; 0.5 to 2 inches wide, 0.75 to 3 inches long.

**FRUIT** dry, brownish, 2-celled capsule, 0.75 inch in diameter, 4 to 8 inches long. Contains numerous flattened, winged seeds. Often persistent.

**ROOTS** thick, fleshy. Aerial roots nearly always in two rows just below nodes.



# COMMON BUTTONBUSH

*Cephalanthus occidentalis* L.

**Stephen L. Beckwith**

*School of Forestry, University of Florida  
Gainesville, Florida*

Common buttonbush is widely distributed in meadows and along borders of streams, lakes, and fresh swamps. It is highly tolerant of prolonged submergence. It grows in shade as well as full light. Fires are infrequent on the moist sites on which the species occurs.

Studies in Texas and Louisiana indicated only light to moderate browsing. In north Alabama, utilization was about 9 percent at concentrations of one deer to 32 acres but rose to 37 percent when deer numbers were doubled. In 423 deer stomachs collected throughout Florida during the winter, buttonbush occurred in no more than 8 and comprised only 0.2 percent of the total food. In the Everglades, deer did not browse it even when they were starving. Penned deer in Louisiana grazed leaves and

twigs moderately in summer and fall but lightly during winter.

Leaves collected during June in north-central Florida had the following analysis: fats 4.4 percent, soluble carbohydrates 57.8, insoluble carbohydrates 10.5, crude protein 14.3, and calcium 0.7 percent.

Waterfowl feed extensively on the seeds. Particularly along the Gulf Coast, wood ducks frequently roost in ponds covered with this shrub.

Buttonbush is unpalatable for livestock. The leaves have a very bitter taste and contain two toxic glucosides, cephalanthin and cephalin.

Its showy flowers are important sources of honey and also make it popular as an ornamental.

## ALSO CALLED

Spanish pincushion, swampwood,  
buttonwillow, button tree, pin-  
ball, snowball, honeyball.



A shrub or small tree 3 to 12 (up to 30) feet tall.

**FLOWERS** numerous, white, clustered in spherical heads 0.75 to 2 inches in diameter. White and tubular corolla, 0.3 inch long. June to September.

**TWIGS** small, glabrous or finely pubescent, reddish when young.



**FRUIT** a round cluster of reddish-brown nutlets each 0.3 inch long. Small flat seeds 0.1 inch long.

**LEAVES** deciduous, 2 to 8 inches long. Opposite or in whorls of 3. Glabrous above, sometimes pubescent on midrib.

# FRINGETREE

*Chionanthus virginicus* L.

**Phil D. Goodrum**

*Bureau of Sport Fisheries and Wildlife, U. S. Fish and Wildlife Service  
Nacogdoches, Texas*

**Lowell K. Halls**

*Southern Forest Experiment Station  
Nacogdoches, Texas*

Fringetree is most abundant in the understory of pine-hardwood forests, especially on moist, acid, sandy loam soils. It reaches best development in semi-open situations but is moderately shade-tolerant, occasionally being found in a dense understory. Though its distribution is wide, it is usually a minor component of the total vegetation. It is among the shorter-lived shrubs.

It is preferred browse for deer in the Gulf Coast Plain, but in the Piedmont and mountains grazing is light. Greatest use is in spring, summer, and fall. The species is moderately intolerant to browsing, and plants often die when

more than one-third of the annual growth is removed. The date-like summer fruit and seeds are taken by many birds and animals, including deer, turkey, and quail. The foliage is eaten by cattle.

Observations in Mississippi, Louisiana, and eastern Texas indicate that hot fires will root-kill most specimens, but that a light fire induces sprouting and helps keep forage available to deer.

Fringetrees are planted throughout the South as ornamentals; they begin to seed when 5 to 8 years old. The bark has medicinal uses as a diuretic and fever remedy.

## ALSO CALLED

White fringetree, old man's beard,  
flowering ash, grandfather-gray-  
beard.





A shrub or small tree up to 35 feet high.

**TWIGS** reddish-brown at tip, stout, pubescent. Leaf scars raised and moderately large; lenticels warty, round or shield-shaped.

**FLOWERS** white and fragrant, borne in delicate drooping panicles 4 to 6 inches long. March to June.

**LEAVES** opposite, deciduous, 4 to 8 inches long, 1 to 4 inches wide. Dark green and glossy above, paler below with hairs on veins.

**FRUIT** a purple oval drupe borne in loose clusters. August to October. Drupes 0.5 to 1 inch long, 1 to 3 seeds.



# SWEET PEPPERBUSH

*Clethra alnifolia* L.

**Robert Kral**

*Virginia Polytechnic Institute  
Blacksburg, Virginia*

Sweet pepperbush is common on acid soils along margins of swamp-forest and shrub-bog communities and in the so-called high bays near the coast. It is killed by long inundation, but increased by drainage and fire.

Generally, it has high forage value and is a preferred browse plant. Deer and cattle take the twigs in winter and the leaves and young shoots in spring. Browse yields in Florida ranged up to 62 pounds per acre, with a maximum of 20 percent utilization by deer. Samples from south Georgia, where the species comprised 2 percent of the total spring forage intake by cattle, contained 13 percent crude

protein, 26 percent lignin, 0.9 percent calcium, 0.12 percent phosphorus, 11 p.p.m. copper, 81 p.p.m. iron, 751 p.p.m. manganese, 47 p.p.m. zinc, and 9 p.p.m. cobalt.

A larger shrub or small tree, cinnamon clethra (*Clethra acuminata* Michx.), is a common and heavily browsed plant in several forest types of the Appalachian Mountains. Observations there showed 75 percent of sprout growth and 50 percent of normal summer growth removed by deer.

Although sweet pepperbush is deciduous, its foliage and fragrant white flowers give it some value as an ornamental.

## ALSO CALLED

Summersweet clethra, spicebush,  
white alder.





Straggling shrub seldom more than 10 feet tall.

**FLOWERS** white, fragrant, borne in erect racemes 3 to 8 inches long. June to September.

**LEAVES** alternate, deciduous, prominently straight-veined; margins conspicuously serrate above the tapering base; 1 to 3 inches long.

**FRUIT** a round 3-sectioned capsule, erect. Fruiting body remains long after ripening.

**TWIGS** have fine hairs, pale to dark brown, when young.



# BUCKWHEAT-TREE

*Cliftonia monophylla* (Lam.) Britton

**Richard E. Eichhorn**

*Florida Game and Fresh Water Fish Commission  
Lake City, Florida*

Buckwheat-tree inhabits the acid, alluvial soil of shallow freshwater swamps and bays, often forming almost impenetrable masses known as titi thickets. It is a transitory species along borders of wet areas but becomes dominant where fires are frequent. Without fire, the true permanent species is probably sweet-bay. Reproduction is mainly by root suckering or basal sprouting in established stands and by seed on open sites.

Deer browse the twigs and evergreen foliage the year around but use *Cliftonia* most during winter. Cattle also browse it somewhat, especially when other green forage is scarce. Nu-

trient quality is moderate. In west Florida, crude protein content was 12 percent on new growth in late spring but dropped to 5 percent in winter. Winter samples in south Georgia contained 6 percent crude protein, 0.39 percent calcium, but only 0.05 percent phosphorus.

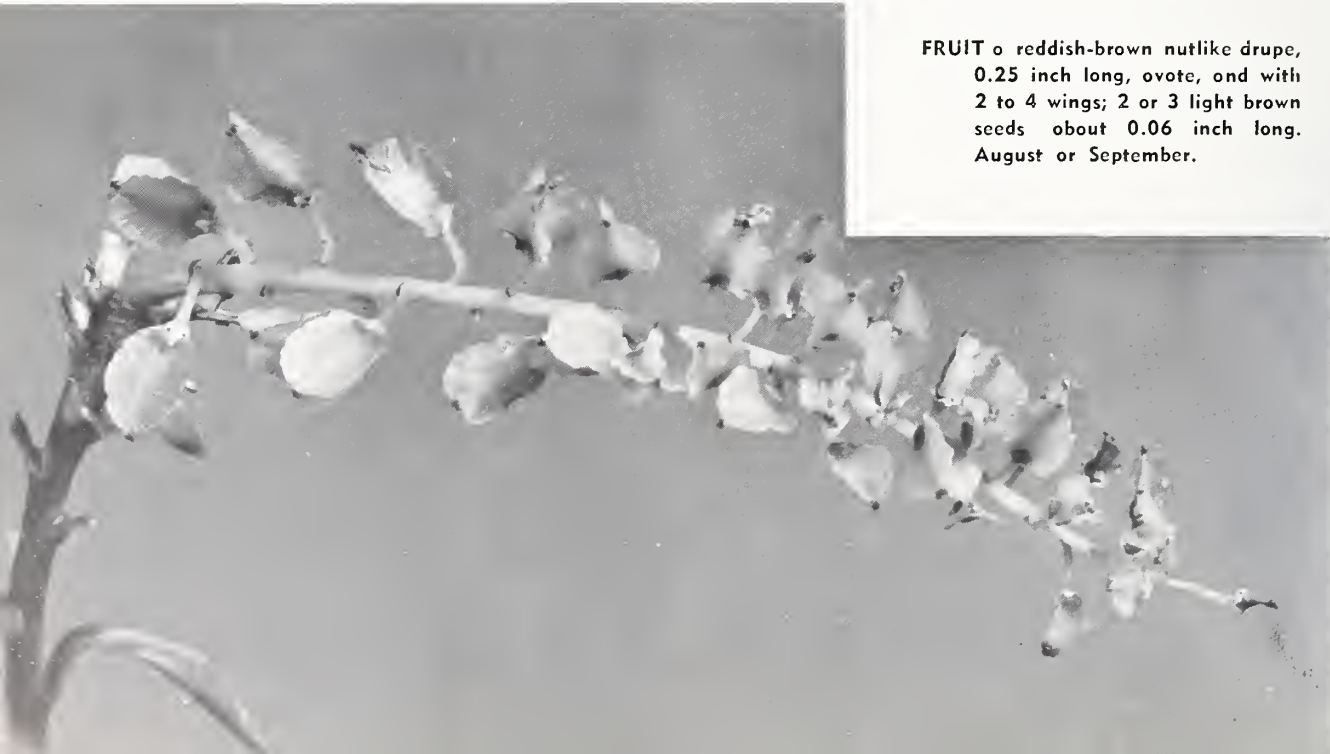
Thickets rapidly grow above the reach of deer. Brush choppers, fire, and herbicides can be used to knock down inaccessible growth and induce adventitious sprouting for greater forage production.

Bees make high-quality honey from the fragrant flowers of this plant. The brittle close-grained heartwood makes very good firewood.

## ALSO CALLED

Titi, black titi, ironwood.

**FRUIT** o reddish-brown nutlike drupe, 0.25 inch long, ovate, and with 2 to 4 wings; 2 or 3 light brown seeds about 0.06 inch long. August or September.





A shrub or small tree 30 to 40 feet tall.

**BUD** tapered to apex, covered with chestnut-brown scales, about 0.25 inch long in winter.

**LEAVES** evergreen, firm, green and shiny above, paler beneath, 1.5 to 2.3 inches long.



**STEM** cylindrical and tapering, with conspicuous leaf scars.

**BARK** deeply furrowed, broken into short broad scales near base.

**FLOWERS** fragrant, small, white or pinkish. In slender spikes 1 to 3.5 inches long, pendant while in bud but erect while blooming. Late winter or early spring.





# FLOWERING DOGWOOD

*Cornus florida* L.

**Frank M. Johnson**

*Bureau of Sport Fisheries and Wildlife, U. S. Fish and Wildlife Service  
Asheville, North Carolina*

Flowering dogwood is an understory species common in young forests. It is most abundant after heavy logging or severe burning. It grows best on sites having a northern aspect and moist, rich loams with a pH of 6 to 7. A shallow root system makes it vulnerable to prolonged droughts.

Because of its browse and fruits and its widespread occurrence, it is one of the most important deer food plants. Foliage and twigs are often heavily browsed except in the Gulf Coast areas where use is light to moderate. It is most palatable in spring and least in winter. Virtually all game species use the fruit.

Cattle frequently compete with deer and may use up to 50 percent of available browse.

Because the bark is thin, stems are easily killed by fire, but rootstocks send up numerous sprouts that provide succulent and nutritious forage. It will die if flooded for several weeks.

The browse is high in calcium, manganese, and cobalt, and generally contains 5 to 7 percent crude protein during the winter.

Its flowers and foliage make dogwood a favorite among gardeners. The wood is used for shuttleblocks in the textile industry and for other specialty products.

## ALSO CALLED

Dogwood, arrowwood, boxwood.



**FLOWER** bracts snowy white or rarely pink, 1.25 to 2.5 inches long. March to June.



**LEAVES** simple, opposite, dark green above, light green and glaucous below, often clustered near end of branches. Blades 3 to 5 inches long, 1.5 to 2.5 inches wide.



A shrub or small tree up to 40 feet tall, with straggly, spreading crown.

**TWIGS** green or purple, often with whitish bloom. Buds scaly, outer scales of terminal bud bivalvate. Leaf scars somewhat raised upon the persistent leaf bases.

**FRUIT** of bright red, clustered drupe, 0.25 to 0.5 inch long. September to October.





# HAWTHORN

*Crataegus* spp.

**Paul A. Shrauder**

*Jefferson National Forest  
Roanoke, Virginia*

Hawthorns are among the most easily recognized groups of woody plants, but specific identification is perplexing. Hybrids are numerous and taxonomists disagree on the number of species. According to one authority, 16 natural groups comprising 33 species occur in the South. This paper deals mainly with the genus.

Many of the hawthorns were introduced into the United States but some occurred as suppressed understory plants in the virgin forests. With the clearing of the dominant trees they were released and spread quickly to pastures, fence rows, and woodland borders. Many are intolerant but some live under moderately dense stands of pine and hardwood. They grow well on a wide variety of soils from swamps to dry, stony ridges. Once past the seedling stage, they are protected from overbrowsing by their long, sharp thorns.

Much of the current twig growth is available to deer and is a fair or medium choice browse throughout most of the South, especially during the growing season. Use slackens as twigs harden, but in the Northeast deer take the browse extensively during winter.

Fruit retained over winter is of particular benefit to game birds and animals, including deer, and the thickets serve as nesting and protection areas for birds. Cattle avoid the plants.

Analysis of cockspur-thorn (*C. crusgalli* L.) indicated that the fruit is deficient in protein and fat, relatively low in nitrogen-free extract, and high in crude fiber.

Birds and mammals disseminate the seed. Because the seedcoats are hard, germination may often be delayed for an entire growing season.

Hawthorns apparently have no important insect or disease enemies. They are alternate host for the cedar apple rust, and occasionally are damaged lightly by a leaf miner.

Their flowers and showy fruits make them highly desirable for parks and gardens. As the Saxon name "haw" implies, the genus has been used as a hedge plant in the Old World for centuries.

The dense, strong wood makes good tool handles and mallet heads.

## ALSO CALLED

Haw, thorn, thorn-apple.



Thicket-forming small trees or shrubs up to 25 feet tall, usually with thorny branches.

LEAVES simple, deciduous, alternate, serrated or lobed.



FLOWERS white or occasionally pink. Showy, and with almond-like fragrance. April-May.

FRUIT of bright red, yellow, or black pome with dry flesh. Contains 1 to 5 hard, flat, grooved nutlets.

TWIGS slender and round. Lenticels oblong and mostly pale. Leaf scar horizontal and slightly elevated, with three bundle scars.

# SWAMP CYRILLA

*Cyrilla racemiflora* L.

**Lewis K. Jeter**

*Florida Game and Fresh Water Fish Commission  
Tallahassee, Florida*

Swamp cyrilla is common on edges of bays or other wet areas, often in pure stands. It apparently thrives best on acid soils and in full light. A notable tolerance of prolonged flooding enables it to survive and dominate on many sites where its associates are drowned out. The aboveground parts are sensitive to fire, but the roots survive and sprout vigorously. On unburned sites it usually is succeeded by other bays, hollies, titis, and pines.

Deer relish the tender shoots, and eat the mature leaves in winter. In some localities they seem to take swamp cyrilla before gallberry and buckwheat-tree. If other forage is scarce, domestic livestock may browse this plant.

It is an important component of titi swamps and thickets, which offer good escape cover; such refuges are particularly important where dogs are used to hunt deer and bear.

On sites dry enough to permit use of machinery, deer browse may be improved by knocking down dense stands of old-growth cyrilla, in order to stimulate new growth. Burning serves the same purpose, but when the cyrilla stands are dry enough to support a fire, surrounding vegetation may be dangerously flammable.

In dense, pure stands, cyrilla interferes with tree reproduction. It is good bee pasture, but has little value either for wood or as an ornamental.

*Cyrilla parvifolia* Raf., or littleleaf cyrilla, is a lower, more compact shrub 3 to 6 feet tall, with smaller leaves and 1- to 3.5-inch racemes. As it corresponds to the larger species in growth habit and palatability, it need not be differentiated in wildlife management.

## ALSO CALLED

American cyrilla, swamp iron-wood, red titi, white titi, leather-wood





**Large shrub or small tree up to 35 feet high.**

**LEAVES** alternate, often clustered at twig tips, leathery, lustrous above, dull and paler beneath, 0.1 to 1.0 inch long. Persistent.

**STEM** slender, smooth, shiny brown to gray.

**FRUIT** a dry, light yellowish-brown capsule, 0.5 to 1.5 inches long. Seeds minute.

**BARK** whitish.

**FLOWERS** white in slender racemes, 2 to 6 inches long. Opening in spring and early summer.



# STRAWBERRY-BUSH

*Euonymus americanus* L.

William H. Adams, Jr.

Tennessee Wesleyan College  
Athens, Tennessee

Strawberry-bush is common on fertile, well-drained but moist sites with a well-defined humus layer. It is most abundant on borders of woods, northern aspects of ravines, along stream edges, in coves, and on rich bottom lands. It is shade-tolerant and makes optimum growth in mature hardwood stands.

Except on some fringes of its range, it is highly preferred browse and an important indicator of deer presence. It is eaten even when animal density is low, although other species may be taken more heavily as herd pressure increases. It virtually disappears on overstocked range.

Plants are readily available during all stages of growth, and are heavily browsed during late

winter and early spring. Both leaves and stems are utilized, but because of its sporadic occurrence strawberry-bush seldom contributes more than two percent of diet. It is consistently high in crude protein.

Strawberry-bush competes little with other browse species or commercial trees. Because it grows best where understory is sparse to moderate, brush fires probably do not become hot enough to kill the rootstock. It is increased by most logging operations and by protection from overbrowsing and hot fires. Birds scatter seed and it can also be propagated from stem cuttings rooted in the fall.

Caterpillars periodically defoliate it, but probably do no permanent injury.

## ALSO CALLED

Burning-bush, fish-wood, bursting-heart.

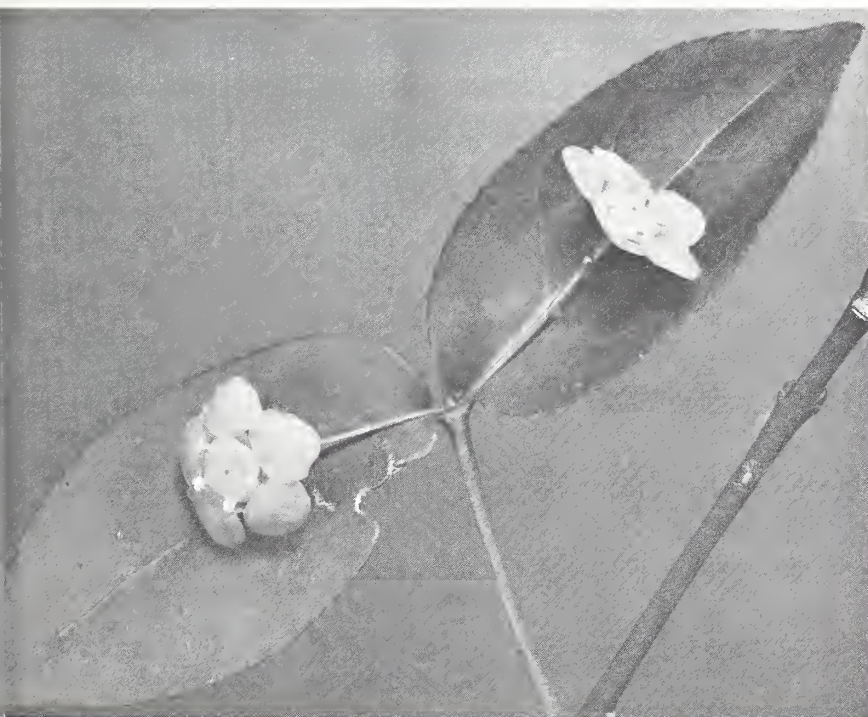




A shrub, upright or semierect, usually not more than 6 feet tall.

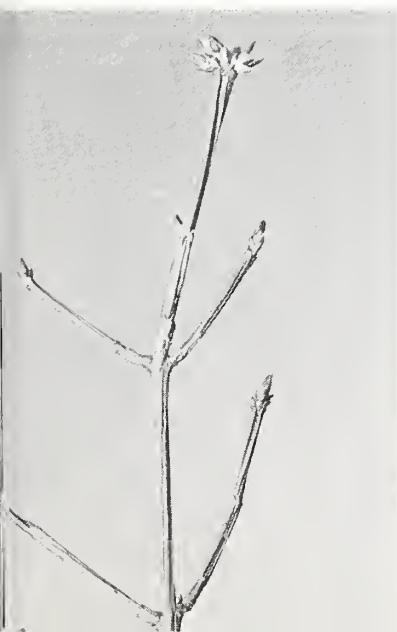
LEAVES thick, bright green, turning pale green or scarlet in fall, 0.8 to 4 inches long, partially persistent in the South.

FLOWERS 0.4 to 0.5 inch, green, 1- to 3-inch cymes. Open in May or June.



FRUIT a warty capsule that turns purple-red and splits at maturity to expose several reddish-orange, pulpy, seed-bearing appendages. September-October.

TWIGS olive green, sometimes spreading and horizontal, somewhat 4-sided.



# YELLOW JESSAMINE

*Gelsemium sempervirens* (L.) Ait. f.

**Roger Rich**

*Southern Forest Experiment Station  
Nacogdoches, Texas*

Yellow jessamine is well distributed throughout forested areas, forming broad interlacing carpets on moist to dry sites and on a variety of soils. It is abundant on all exposures, and thrives in full sunlight. Plants under a forest canopy respond readily when the timber is cut or thinned.

It is desirable forage the year around but is taken most readily in late fall and winter. Availability is limited only by its climbing habit. Utilization exceeding 50 percent of the current growth lowers the vigor and may kill the plant.

Forage production varies with browsing pressure and burning. In east Texas green-weight yields per acre on an unburned area were reduced from 20 pounds to 5 pounds during a 4-year period when utilization varied from light

to more than 50 percent. On another area, yields were 137 pounds per acre the first growing season after a burn, as compared to 92 pounds when unburned. Repeated burning may damage roots, reduce production, or kill the plant. Availability of jessamine forage may be increased by lopping over non-commercial trees on which the plant is growing.

Stem tips collected in east Texas during the winter contained 7 percent crude protein, 8 percent fat, 0.14 percent phosphorus, and 0.46 percent calcium. Spring or summer burns help to increase the nutrient quality.

All parts of the plant contain the alkaloids gelsemine and gelseminine, which are poisonous to cattle but not deer. Cattle seldom eat jessamine when good forage is adequate. The plant is often used in landscape gardening.

## ALSO CALLED

Evening trumpet flower, Carolina jessamine.



A slender vine trailing or twining up to 20 feet.

**LEAVES** opposite, evergreen, shiny, entire, 1 to 3 inches long.

**FLOWERS** trumpet-shaped, deep yellow, deliciously fragrant, fragile, 1 to 1.5 inches long. Open in February to April.

**FRUIT** capsule 0.3 to 0.6 inch long. Seeds flat, winged, 0.2 to 0.25 inch long.

**STEM** wiry with smooth ridges, more or less with mottled gray cost.



# SMOOTH HYDRANGEA

*Hydrangea arborescens* L.

Malcolm Edwards

Georgia National Forests  
Gainesville, Georgia

Smooth hydrangea is most abundant in well-drained soils along steep road banks and forest openings at elevations of 2,000 to 4,000 feet. It tolerates approximately 70 percent shade and grows luxuriantly with less than 50 percent shade. The growth under a thin canopy is composed mainly of long (3 to 5 feet) shoots coming from the root or the old stem. These cluster up through and around the old growth to form a thick bush. Under heavy shade, the form is straggly and annual growth is limited to 6- to 12-inch shoots from the higher branches. All plants respond quickly to any increase in light.

Deer browse it at all seasons. In relatively good range it is taken soon after buffalo-nut and strawberry-bush. Intensive use of smooth

hydrangea is indicative of an overpopulated deer range. Spring and summer use of leaves, shoots, and twigs has been heavy where deer populations were high in the mountains of North Carolina and Georgia. It is classified as important winter browse in West Virginia and observations indicate that approximately 30 percent to 40 percent of the annual growth can be taken without damage to the plant. In Missouri, when the species was browsed repeatedly during the growing season, 31 of 85 marked plants were killed or severely damaged.

The flowers and fruits are eaten by deer, turkey, and other wildlife. Cattle may be poisoned by the hydrocyanic acid that forms in the leaves of plants injured by frost or drought.

## ALSO CALLED

Hills-of-snow, mountain hydrangea, sevenbark, wild hydrangea.





Irregularly shaped shrub up to 10 feet tall, growing in clumps.

**FLOWERS** borne in creamy white cyme 2 to 6 inches broad; larger white sterile flowers on outer edge. June to July. Cyme persists through winter.

**LEAVES** 2 to 6 inches long, opposite, deciduous, dark green above, paler beneath. Crushed parts have bitter taste and unpleasant odor.

**FRUIT** many-seeded capsule, about 0.1 inch wide. October to December.

**TWIGS** slender, light brown; old bark sometimes shreddy.



# HOLLIES

*Ilex* spp.

The hollies are among the chief browse plants of the Coastal Plain. Yaupon, the most valuable, is here discussed separately, while three

other species—possumhaw, large gallberry, and dahoon—are described as a group.

## YAUPON

*Ilex vomitoria* Ait.

**Daniel W. Lay**

*Texas Game and Fish Commission  
Buna, Texas*

Contribution of Federal Aid in Wildlife Restoration Project, Texas W-80-R.

Yaupon prefers moist sandy soils with permeable subsoils. It grows in the open and also thrives in fully stocked pine stands. It does not compete seriously with pines. Hot or frequent fires will eliminate it, but occasional fires of moderate intensity are beneficial in keeping foliage within reach of deer. Full development of a yaupon understory in an unburned pine forest may take 10 to 15 years.

Deer readily eat the leaves and twigs in fall and winter; on heavily stocked ranges, they use the plant all year. It is also relished by cattle. On some ranges in central Texas it is the only common evergreen deer food and can support one deer to four acres or less. Under pine stands in east Texas it often produces 150 pounds per acre of browse. Seedlings, obtainable from some nurseries, may be used for deer food plantings. One trial with yaupon planted between rows of slash pine produced 54 pounds of green browse per acre the third year.

Heavy utilization causes tight hedging. The short, stiff branches protect enough leaves inside the crown to minimize mortality, but while

the forage stays within reach the yield is reduced and reproduction may be eliminated. Optimum use may be about 40 percent of the annual growth.

The fruits are sought the year around by deer, quail, turkeys, squirrels, raccoons, and many songbirds, all of which help distribute the seeds. Most plants with stems 2 inches or more in diameter will bear some fruit each year, but production varies. On one series of plots, 10.8 pounds per acre were produced one year and 4.2 pounds the next. There are about 2,500 fruits per pound.

In east Texas, the crude protein content of yaupon browse on unburned ranges varied from 9 percent in spring to 7 percent in winter. On burned ranges protein varied from 15 to 11 percent. Phosphoric acid content of unburned browse was 0.25 percent in spring and 0.16 in winter; on burned ranges it was 0.43 and 0.19 percent. Leaves contain appreciable caffeine and are sometimes brewed into a drink which, when consumed in excess, causes vomiting. Yaupon is widely used as an ornamental because of its lustrous foliage and red berries.

### ALSO CALLED

Cassine, evergreen holly, Christmas berry.





**Thicket-forming shrub up to 25 feet tall.**

**STEM** with stiff divergent branches, smooth whitish-gray bark.

**FLOWERS** small and white in nearly sessile clusters on branches of previous year; some monoecious, others dioecious.

**LEAVES** evergreen, leathery, dark green and lustrous above, pale below, 0.5 to 2 inches long. Persist for 2 or 3 years.

**FRUIT** bright red drupe 0.25 inch in diameter. Matures in October and persists into winter. Four pale amber seeds 0.15 inch long.



## DAHOON

*Ilex cassine* L.

## LARGE GALLBERRY

*Ilex coriacea* (Pursh) Chapm.

Alfred L. Johnson

Mississippi National Forests  
Jackson, Mississippi

*Dahoon*, an introduced species, is common along stream borders and pond edges, and thrives in closed canopies of southern pines.

Deer and cattle browse it all year. The ripened red fruits are eagerly sought by birds in early fall and winter.

It is a profuse sprouter and forage can be increased by cutting tree-like plants.

In its northern range dahoon is often used for screen plantings and borders, but is susceptible to winterkill. The berries are frequently used for Christmas decorations.

*Large gallberry* grows scatteringly in the shade or open along streams and swamps as well as in upland sites with sandy acid soils. It is one of the most highly preferred browse plants within its range and furnishes palatable forage throughout the year. Plants yield well even where browsing is heavy.

Game animals and birds eat the fruits but the yields are generally less than for other hollies.

Unless the stems are killed back regularly by fire or other means, most of the foliage grows beyond reach of deer. Rootstocks sprout readily after a burn.

The plant closely resembles the unpalatable little gallberry (*Ilex glabra* L.) but can be distinguished by the spine on its leaf margins, glaucous undersurface of leaves, and a generally larger growth.

*Possumhaw* occurs only along streams or ponds. The persistent orange to scarlet fruits make it conspicuous during fall and winter.

Deer and cattle eat leaves and tender twigs in early spring, and the fruit is taken in winter by many birds. The plants often interfere with timber reproduction, but can be controlled by burning or slashing stems, or killed by spraying with 2,4,5-T in diesel fuel. From the standpoint of game management slashing or burning is preferable because the resultant sprouts are readily eaten by deer.

### DAHOON IS ALSO CALLED

Dahoon holly, Christmas berry,  
yaupon, cassena, Alabama dahoon.

### LARGE GALLBERRY IS ALSO CALLED

Shining inkberry, baygall-bush, tall  
inkberry holly, sweet gallberry.

## POSSUMHAW

*Ilex decidua* Walt.

### POSSUMHAW IS ALSO CALLED

Swamp holly, deciduous holly,  
bearberry, winterberry.





A shrub or small tree up to 25 feet tall.

**LEAVES** 1.3 to 4 inches long, leathery, with down-like hairs beneath. Evergreen.

**FLOWERS** numerous, small, white in umbel-like clusters, usually on a new growth. May-June.

**FRUIT** bright to dull red or yellow globose drupe, 0.2 to 0.75 inch in diameter. Four nutlets, each about 0.16 inch. Persists until spring.

**STEM** slender, finely hairy the first 2 or 3 years. Leaf scar crescent-shaped, bundle scar solitary. Pith smooth and continuous.



A shrub usually less than 10 feet high.

**LEAVES** 1.5 to 3 inches long. Glaucous beneath. Tips acute and short. Sharp spines or sparingly barbs on leaf edge from about midpoint to tip. Evergreen.

**FLOWERS** small and white. April-May.

**FRUIT** a shiny black drupe, smooth, soft, and pulpy. Ripens in fall.

**STEM** slender, green to gray, smooth or slightly hairy.

## LARGE GALLBERRY



A shrub or small tree up to 30 feet tall.

**LEAVES** 1.25 to 3 inches long, 0.5 to 1.5 inches wide. In crowded groups at end of short branchlets. Thick and firm, deciduous. Smooth on upper surface, lower surface sometimes pubescent on ribs.

**FLOWERS** small, whitish. March to May.

**FRUIT** a globose drupe, orange to scarlet, 0.3 inch in diameter. Ripen in early fall.

**TWIGS** have gray bark with warty-appearing lenticels.

## POSSUMHAW



# VIRGINIA SWEETSPIRE

*Itea virginica* L.

**Richard F. Harlow**

*Florida Game and Fresh Water Fish Commission  
Tallahassee, Florida*

Virginia sweetspire is a scattered plant in organic acid soils on wet sites. It grows best on the outer edges of forest stands where it receives sunlight for much of the day, but it also grows in dense cypress swamps. Although most prevalent in shrubby stages of plant succession, it is occasionally found in ultimate stages of wet forest types.

The leaves and twigs are very palatable and used heavily, all year, but because of its scattered occurrence Virginia sweetspire does not comprise a major portion of deer diet. Thirty percent of 423 stomach samples taken during winter in Florida contained Virginia sweetspire even though it was far less prevalent than other browse plants. Cattle also relish it and compete with deer during winter. If animal numbers are high, the plant may be browsed out.

Crude protein content is high. Plants collected in Florida contained up to 21 percent in May. Even more important, the minimum dropped no lower than 11 percent.

Partial overstory removal, together with occasional burning (every three or four years, if possible), helps to increase this shrub. If cattle are numerous, it may be desirable to fence out small acreages on which the plant is prevalent. Timber management does not usually limit this plant. Insect damage is light, probably because of the sparse distribution.

For landscaping, it should be planted in moist, shady places. Because the leaves do not wilt or shatter, cuttings make attractive table arrangements.

## ALSO CALLED

Sweetspires, Washington-plume,  
tassel-white, Virginia-willow.



A shrub up to 9 feet tall.

**LEAVES** light green, 2 to 6 inches long. Finely serrated margin except near base. Deciduous, but persistent in Florida, turn reddish-brown before falling.

**STEMS** long and sparsely branched.

**FRUIT** a two-grooved capsule, 0.25 to 0.4 inch long. July to September.

**BUDS** tiny, leaf scars alternate and not encircling twig.

**FLOWERS** white, in conspicuous racemes, 1.5 to 5.2 inches long. April to June.

**ROOTS** fibrous; underground runners send up stems.





# EASTERN REDCEDAR

*Juniperus virginiana* L.

**Hewlette S. Crawford, Jr.**

*Southern Forest Experiment Station  
Harrison, Arkansas*

Eastern redcedar occurs most often on dry calcareous soils in full sunlight. It is drought resistant and frost hardy, but cannot withstand flooding. Trees 100 to 125 years old are often found along bluffs or steep rocky slopes. Most reproduction is from seeds that birds or mammals drop on bare or partially bare soil.

The stems, being rather thin-barked, are readily girdled by fire. The foliage, however, does not burn easily, and therefore fires generally will not penetrate stands unless litter is heavy.

New growth changes from succulent green to light brown in the second year but does not become woody until the third season. Most authorities agree that the foliage, even the young growth, is poor deer food. Nevertheless,

the numerous low, lateral branches provide an abundance of green roughage when other food is scarce. During such times, browse lines develop on older trees, and younger ones become hedged. Tree-size plants are seldom killed, but most reproduction is destroyed.

The fruits are eaten by many wildlife species including birds, rabbits, foxes, raccoons, skunks, and coyotes. The wood is very durable and is used for posts, furniture, boats, and paneling. Many varieties are horticulturally important.

Stockmen consider redcedar a nuisance because it produces poor forage, and is an aggressive invader on overgrazed ranges or abandoned fields, often completely dominating such sites.

## ALSO CALLED

Red juniper, redcedar, savin.





JUVENILE



LONG-SHOOT



SCALE-LIKE



Small tree, commonly 10 to 40 feet tall, with a pyramidal crown that becomes round in old age.

**LEAVES** are of three types: (1) Juvenile on plants up to about 5 years old, with short sheath and longer needle-like blade. (2) Longshoot leaves with sheaths longer than blades. On vigorous extremities of older trees. (3) Scale-like on less vigorous spur stems.

**FLOWERS** small, cone-like on end of short twigs. Dioecious, rarely monoecious. March to May.

**FRUIT** a fleshy, sweet, pale blue berrylike cone, 0.25 to 0.4 inch in diameter, with 1 or 2 seeds. September to December.

**BARK** thin, light reddish-brown, separating into long narrow strips.

# YELLOW-POPLAR

*Liriodendron tulipifera* L.

**Thomas H. Hooper**

*Alabama National Forests  
Montgomery, Alabama*

**Francis X. Leuth**

*Alabama Conservation Department  
Centreville, Alabama*

Yellow-poplar grows best on moderately moist, well-drained soils of loose texture. It sprouts vigorously from stumps and rootstocks following cutting or fire. It invades abandoned farmlands. In rich coves of the southern Appalachians heavy cutting, with accompanying widespread soil disturbance, invites abundant regeneration that ultimately develops into stands of high quality and heavy volume.

Sprouts, buds, flowers, and seedlings are preferred deer browse in spring and early summer, but become less desirable later in the growing season. Yellow-poplar in North Carolina rated equal in palatability with greenbrier, blackgum, sweetbay, and Virginia-willow. When they have a choice, deer usually prefer sprouts to seedlings. As stumps sprout readily, timber harvests increase forage supplies.

Regeneration of yellow-poplar is difficult where deer populations are high, but can be accomplished if forage is abundant. On heavily stocked range in high coves of North Carolina, seed-tree cuttings over large acreages produced more than 800 pounds of high-quality forage per acre, in contrast to 5 to 20 pounds before cutting. While the method was drastic and expensive, it apparently provided more food than the herd could eat, and ample seedlings survived for a new stand.

If permitted to run in the woods, livestock compete with deer for yellow-poplar, and are capable of even greater utilization because they are heavier animals that use their weight to push over small trees and eat the tops. Birds and squirrels like the seed and beavers cut young stands near water.

## ALSO CALLED

Tuliptree, tulip-poplar, white-poplar, whitewood.





A large tree attaining a height of 100 to 200 feet.

**LEAVES** truncate, 4-lobed, very smooth, deciduous, 4 to 6 inches long and broad.

**FRUIT** a samara-bearing cone, about 3 inches long. Seed dispersed September to November.

**FLOWERS** greenish-yellow, orange banded at base, tulip-like. April-May.

**TWIGS** dark green to gray. Large leaf scars nearly circular, terminal buds with two outer scales.



# JAPANESE HONEYSUCKLE

*Lonicera japonica* Thunb.

**Lowell K. Halls**

*Southern Forest Experiment Station  
Nacogdoches, Texas*

**Phil D. Goodrum**

*Bureau of Sport Fisheries and Wildlife, U. S. Fish and Wildlife Service  
Nacogdoches, Texas*

Japanese honeysuckle thrives along streams, fence rows, and borders of woods. Introduced into America from Asia, it freely escaped into hedgerows, forests, and fields from seed disseminated by birds. Once established it propagates from stolons, which on open, moist sites spread as much as 15 feet in a year. It is an effective binding for embankments.

Honeysuckle is relished by deer. The dense network of vines and leaves yields abundant forage. Both old and new growth are readily eaten the year around, but primarily in winter. Frequently the outer stems and leaves are browsed very closely, but the tangled mat of old stems forms a barrier against complete removal. New shoots arising from this old growth are a continuous source of forage.

Its ease of propagation and high vigor make it valuable as game food but a nuisance in timber management. The most difficult task is confining it to specified areas. Uncontrolled it overwhelms and strangles low-growing plants and trees, including some that are valuable to wildlife. In open areas it quickly covers the ground and severely restricts forest tree regeneration. It competes with young timber in 10 percent of the forest land from Georgia to Maryland. In timber stands of pulpwood

size and larger, shading and needle cast keep it in check until the trees are harvested.

Fair control can be had by spraying plants twice during the growing season with a 2:1 mixture of butoxyethanol esters of 2,4-D and 2,4,5-T diluted to two pounds acid equivalent in 65 gallons of water. Still more effective is spraying with 3-amino-1,2,4-triazole, mixed at the rate of 4 pounds per 100 gallons of water, plus 4 ounces of a wetting agent.

Heavy summer grazing by cattle for successive years will weaken honeysuckle but a followup with herbicides is necessary to kill most plants. Burning curtails establishment but does not eradicate established stands. It is useful as a preliminary to herbicidal treatment. Plowing with a heavy-duty tandem harrow, either before or after spraying, has been effective on open areas in the Piedmont.

Honeysuckle makes good winter forage for cattle. It provides excellent cover for quail and turkey, and they, along with songbirds, eat the fruit and leaves.

It is often seen as an ornamental. The beauty and fragrance of its flowers in spring are unforgettable.

## ALSO CALLED

Honeysuckle, southern honeysuckle, white honeysuckle, and Chinese honeysuckle.



## JAPANESE HONEYSUCKLE



A trailing or twining woody vine.

**LEAVES** semi-evergreen, entire, hairy, 1 to 3 inches long; 0.5 to 0.75 inch wide.

**FLOWERS** fragrant, in pairs from leafy bracts. Corolla 0.5 to 1.5 inches long, white or pink, later yellow. June to August.

**FRUIT** a black pulpy berry, 0.16 to 0.25 inch long.

**STEM** bark shreddy. Twigs reddish-brown, hairy, hollow in center.



## SWEETBAY

*Magnolia virginiana* L.

**Robert Kral**

*Virginia Polytechnic Institute  
Blacksburg, Virginia*

Sweetbay is common on sites that are poorly drained or often flooded. Such sites are usually acid but the species also grows in alkaline soils of ravines and hammocks.

It tolerates shade but is favored by logging of a swamp forest. Drainage and lowering of the water table may limit it to waterways. Burning of the shrub bogs causes it and many of its associates to be replaced by cane stands or—in the longleaf and slash pine type—by saw-palmetto. An increase of organic matter in the form of muck may reduce or eliminate sweetbay from the shrub bog.

Sweetbay somewhat resembles southern magnolia (*Magnolia grandiflora* L.), loblolly-bay (*Gordonia lasianthus* (L.) Ellis), and redbay. It may be quickly distinguished by the startling whiteness of its lower leaf surfaces.

The leaves and twigs are browsed all year. Utilization by deer is generally moderate to

heavy, depending on whether plants are abundant or scarce. In Florida forests where production was 115 pounds per acre, 38 percent of current growth was taken.

Winter browse samples from Georgia contained 10 percent crude protein, 21 percent lignin, 0.55 percent calcium, 0.10 percent phosphorus, 5.0 p.p.m. copper, 74 p.p.m. iron, 168 p.p.m. manganese, 27 p.p.m. zinc, and 0.6 p.p.m. cobalt. In east Texas crude protein averaged 10 percent, phosphorus 0.08, and calcium 0.29 percent.

Cattle compete strongly for sweetbay—in winter it may contribute 25 percent of their diet. Gray squirrels, white-footed mice, and songbirds eat the seeds.

Its persistent leaves, fragrant white flowers, and decorative fruit make sweetbay attractive to gardeners.

### ALSO CALLED

Swampbay, sweetbay magnolia,  
whitebay, evergreen magnolia.





Large shrub or small tree up to 35 feet tall.

**LEAVES** alternate, tardily deciduous in North or persistent; leathery, pungently aromatic, 3 to 6 inches long, 1 to 2.5 inches wide. Upper surface dark green, lower chalky white and often silky.

**FLOWERS** white and fragrant, 2 to 3 inches broad. May to July.

**FRUIT** a cone-like aggregate of small to ovoid follicles, yellow or reddish when ripe.

**BARK** gray, smooth or slightly furrowed on older plants, aromatic, bitter.

**TWIGS** slender and bright green. Winter buds covered with fine silky pubescence.



# BLACKGUM

*Nyssa sylvatica* Marsh.

**William H. Moore**

*Southeastern Forest Experiment Station  
Asheville, North Carolina*

Blackgum is common from the moist sites of the Coastal Plain to the dry, exposed ridges of the interior. It is a prominent member of hardwood communities, but is usually most abundant in young stands. In the mountains it is found most often on sheltered slopes and occasionally on the higher, exposed ridges and peaks. It grows most rapidly and reaches largest size on moist sites in the southern portion of its range. Normally, it is thrifty and not affected by insects and diseases.

Young trees and sprouts provide considerable deer browse throughout the South, and virtually all wildlife and livestock eat various portions of the plant. It is rated a staple food of whitetails and apparently is of intermediate palatability. On southeastern ranges, leaves

and tender shoots comprise 2 to 5 percent of the total diet of deer during spring and summer. Many animals and birds eat the fruit.

Spring browse collections in south Georgia contained 13 percent crude protein, 0.65 percent calcium, and 0.12 percent phosphorus. Winter samples elsewhere had only 3 percent crude protein.

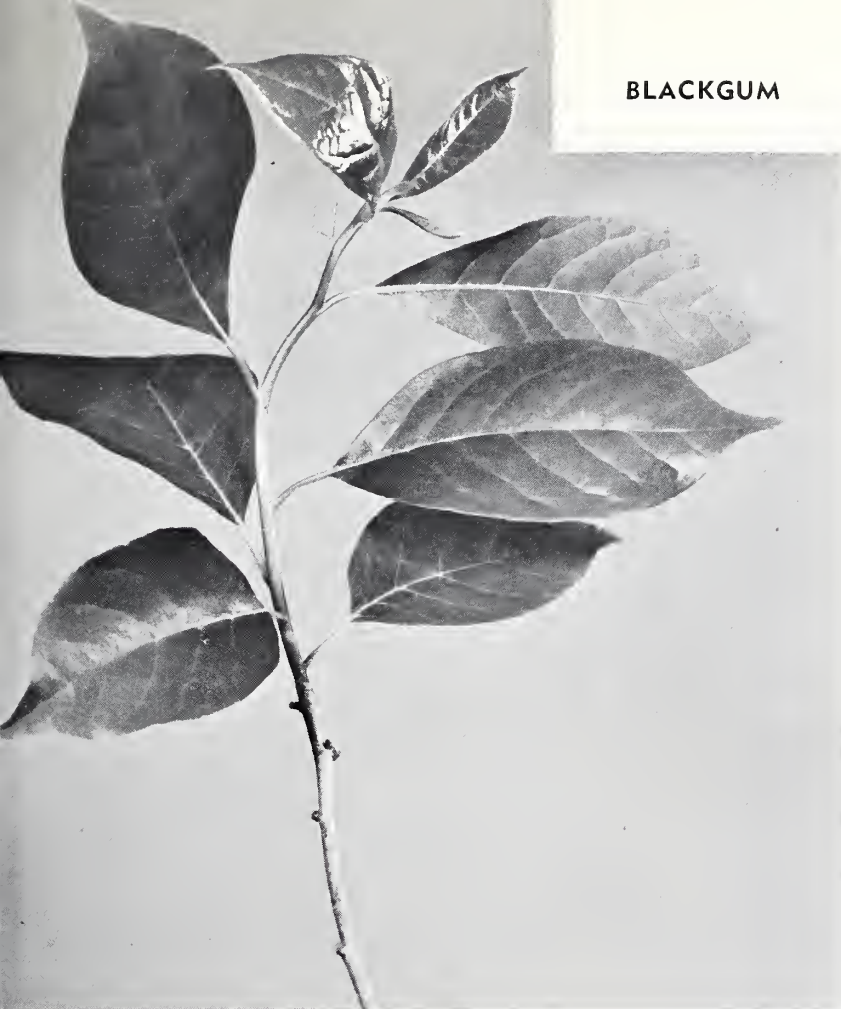
Blackgum sprouts profusely if the tops are killed, and thrives as a source of browse in the southern pinelands where prescribed burning is part of timber management.

It yields excellent honey and, partly because of its strikingly brilliant autumn coloration, is often planted as a shade tree. The wood has many commercial uses.

## ALSO CALLED

Black tupelo, pepperidge, sour-gum, tupelo-gum.





A tree up to 100 feet tall.

**LEAVES** alternate, simple, deciduous, 2 to 6 inches long, 1 to 3 inches wide. Lustrous green above, paler and hairy below.

**BARK** gray to light brown, deeply fissured into irregular blocks.

**TWIGS** moderately stout, reddish-brown, zigzag appearance. Terminal bud aoid, about 0.25 inch long, covered with several overlapping reddish-brown scales. Half-round leaf scars, 3 conspicuous bundle scars.



**FLOWERS** in axillary clusters, perfect and imperfect. April to June.

**FRUIT** an egg-shaped drupe, acid, dark blue to black, 0.3 to 0.65 inch long. September-October.

**ROOTS** are spreading and shallow. In wet sites, they often produce knees.

## SOURWOOD

*Oxydendrum arboreum* (L.) DC.

A. Randolph Shields

Roanoke College  
Salem, Virginia

Sourwood is widely distributed in all types of southern forests, but is most common on well-drained acid soils of slopes and ridges. It is not found in pure stands, but occurs only as an occasional tree. Rootstocks sprout profusely after a fire. Stems that die from suppression sprout at varying heights. The species seeds into old fields, and readily grows into large trees if not disturbed.

On the Pisgah National Forest of North Carolina, normal twig and bud growth of summer was rated moderate in palatability, and sprouts were ranked somewhat higher.

Approximately 40 percent of current growth can be utilized without damaging the plant. Management for browsing consists mainly of cutting back trees to encourage basal sprouting.

Caterpillars of the sphinx moth often defoliate young trees in late spring but probably do no great harm.

The flowers yield a fine honey. The wood is of little commercial value.

### ALSO CALLED

Sorrel-tree, sour-gum, elk-tree, titi.



**FRUIT** a gray capsule 0.25 to 0.5 inch long. Tiny seeds shed in September or October, capsule persists into winter.



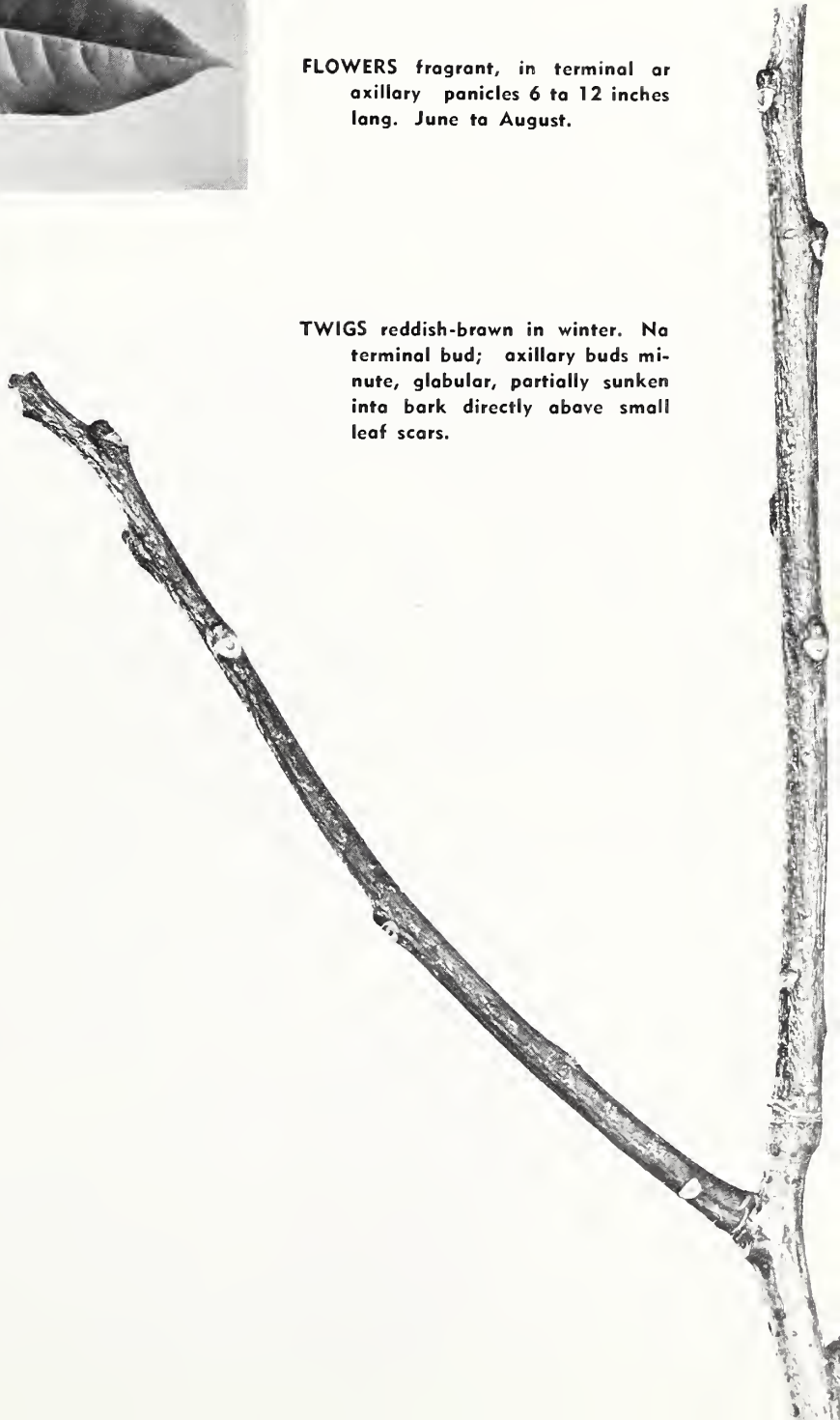


A tree up to 70 feet tall.

FLOWERS fragrant, in terminal or axillary panicles 6 to 12 inches long. June to August.

TWIGS reddish-brown in winter. No terminal bud; axillary buds minute, glabular, partially sunken into bark directly above small leaf scars.

LEAVES bronze-green at first, red in fall; 3 to 7 inches long, 1 to 3 inches wide; sour or bitter in taste.





## REDBAY

*Persea borbonia* (L.) Spreng.

**Phil D. Goodrum**

*Bureau of Sport Fisheries and Wildlife, U. S. Fish and Wildlife Service  
Nacogdoches, Texas*

Redbay occurs scattered or in thickets along margins of streams, in swamps and hammocks, and occasionally as an understory species in the uplands. It grows well either in deep shade or in the open, and in both young and old forest stands.

It is of intermediate palatability to deer. At low herd densities it is eaten sparingly; but with heavy stocking current growth is usually browsed closely, old growth taken occasionally.

Fire stimulates seed germination and induces the growth of vigorous, palatable sprouts. A prescribed burn in the longleaf pine belt of Mississippi increased seedling and sprout growth sixfold. Winter burning at 3- or 4-year intervals is probably best for making this species most valuable for deer forage.

Nutrient quality is above average. In samples from North Carolina and Texas crude protein ranged from 16 percent in spring to 7 percent in winter, phosphoric acid from 0.24 to 0.14 percent, and calcium from 0.61 to 0.31 percent.

Because redbay is browsed mainly in fall and winter, it withstands grazing well. In Mississippi, 40 percent of the annual growth was removed for 2 or 3 years without mortality. On heavily stocked ranges plants whose foliage is entirely accessible to deer may be killed.

In the longleaf pine belt, redbay seed is important to bobwhite quail; in some years it forms 37 percent of the total vegetable diet during fall and winter. The dried leaves are a flavoring for gumbo and meat dishes.

### ALSO CALLED

Sweetbay, redbay persea, swamp-bay.



Small to medium tree.

**LEAVES** aromatic, alternate, persistent; bright green and shining above, dull green and glaucous beneath; 2.5 to 5 inches long, 1 to 1.25 inches wide.

**FRUIT** dark blue or deep purple drupe, egg-shaped, 0.25 to 0.5 inch long.

**FLOWERS** small, pale yellow, borne in axillary panicles. May to July.

**BARK** broken into flat ridges, deep fissures.





# BLACK CHERRY

*Prunus serotina* Ehrh.

**Harold Alexander**

*Arkansas Game and Fish Commission  
Conway, Arkansas*

Black cherry grows in mixed hardwood forests, along streams, and in fence rows. Young trees commonly occur in partial shade.

In most of the South deer make only incidental use of the twigs and leaves. Black cherry was avoided on stocked ranges in north Arkansas, but taken moderately in heavily browsed enclosures in Alabama. In Texas it is considered unpalatable to deer.

Further north it is an important browse plant. In West Virginia it appears to be taken

ahead of most other species. In Pennsylvania it is regarded as a preferred plant, and both sprouts and seedlings are heavily used.

The ripened fruits are used as a basic flavoring extract and eaten occasionally by man. They are also relished by deer, raccoon, opossum, squirrel, bear, rabbit, and many birds. The hydrocyanic acid that is sometimes present in leaves is poisonous to livestock but apparently not to deer. The tree has a very high commercial value for sawtimber.

## ALSO CALLED

Mountain black cherry, rum cherry.







A tree up to 100 feet tall.

**LEAVES** simple, alternate, deciduous, fine-toothed; 2 to 6 inches long, 1 to 2 inches wide. Midrib rusty on lower side.

**FLOWERS** white, in drooping panicles. Appear before leaves mature.

**FRUIT** reddish or black globose drupe, 0.3 to 0.5 inch in diameter. June to October.

**STEMS** with rank, bitter-almond taste, inner bark aromatic. Leaf scars half round to elliptical.



## BUFFALO-NUT

*Pyrularia pubera* Michx.

A. B. Massey

*Virginia Polytechnic Institute*  
*Blacksburg, Virginia*

Buffalo-nut is an understory plant of moist, cool sites in the southern highlands.

It is highly preferred browse, and an important and widely recognized indicator of the presence of deer; to some extent it reflects population density. Though it has marked tolerance to browsing and resprouts vigorously, sustained overgrazing has eliminated it from many areas of the southern Appalachians. Its

use as an indicator must be tempered with knowledge of past occurrence, for while plants are often locally common the distribution is by no means uniform.

Management information is meager, but it may be reproduced by planting the nuts in fall. The whole plant, especially the fruit, contains an acrid, poisonous oil which is apparently not harmful to deer.

ALSO CALLED

Oilnut.



## BUFFALO-NUT

51



Stroggling shrub 3 to 10 feet tall;  
parositic on roots of woody plants.

**TWIGS** dull gray. Leaf scars braad,  
straight along upper edge,  
bundle scars 2. Winter bud  
greenish, prominent, divergent.

**LEAVES** deciduaus, thin, light green,  
2 to 6 inches lang. April-May.

**FRUIT** pear-shoped drupe about 1  
inch long, containing ane nut  
0.5 to 0.75 inch in diameter.  
Matures in September; seeds  
germinate in late fall.

**FLOWERS** small, unisexual, light green  
ta yellowish, in short spikes. May.





# OAKS

*Quercus* spp.

Jack O. Collins and Robert E. Murry

*Louisiana Wild Life and Fisheries Commission  
Alexandria, Louisiana*

In addition to being extremely valuable for mast, several oaks are eaten as browse. Most important are white oak and three members of the black oak group: water, willow, and laurel oak.

The unisexual flowers generally appear with leaves in spring. The male are in naked aments and the female are scattered or somewhat clustered. The fruit of white oaks matures in one year, black oaks in two.

The black oaks discussed here are found on moist bottom land soils and to some extent on upland soils. Seedlings are intolerant but will grow under partial shade for several years. White oak is most common on the upper slopes of upland soils and well-drained alluvium of bottom lands. It is moderately shade tolerant. Fire damages all oaks, but white oak is less susceptible than the others.

Oaks contribute to deer browse only as seedlings or sprouts. They are eaten mainly during fall and winter but year long if stocking is heavy. Use of older trees is negligible but overbrowsing kills many seedlings and malforms others, thus damaging timber regeneration.

Forest management practices which favor oak sprouts, such as logging and timber stand improvement, may also benefit deer. In a study by the Louisiana Wildlife and Fisheries Commission in central Louisiana where deer concentrations were extremely high in relation to food supply, white oak sprouts were browsed heavily the first year after culls were girdled. The second year browsing was light and third year negligible.

In east Texas water oak is classed as desirable browse, with white and willow oak as intermediate. Winter collections of white oak contained 7 percent crude protein and 0.15 percent phosphoric acid.

Acorns are considered by many to be the most important game food in the South. For example, the Mississippi Delta acorns provide much of the winter diet for deer. On the Bank-

head National Forest in Alabama acorns and leaves made up over 50 percent of early winter food. In Missouri the seasonal contribution of acorns to deer diet ranged from 8 to 80 percent over a five-year period.

The big disadvantage of acorns is their uncertainty of production. A good white oak mast year is generally followed by several poor years. Black oaks are generally cyclic, producing good harvest one year and poor the next. Over a five-year period in Missouri the number of acorns per tree on white oak ranged from 0 to 1,900 and on black oaks 100 to 2,500. The average number of sound acorns per pound ranged from 118 to 236. In southern Appalachian hardwood stands which averaged 27 oaks per acre 10 inches d.b.h. or larger, the per-acre yield of acorns was 147 pounds. In bountiful years yields are 2 to 3 times this amount.

Acorns, although low in protein, are high in carbohydrates. When acorns are plentiful, deer fatten quickly in the fall and reproduce well the next year. Poor mast crops result in undernourished deer and an overbrowsed range. Extreme acorn shortages can be averted somewhat by retaining trees in both white and black oak groups, according to wildlife technicians. Five to ten trees per acre over 10 inches d.b.h. that will grow into quality trees are recommended.

Acorn production begins when trees are about 20 years old. Only a small percent of the fruit ripens to maturity. Drought may hasten fall. In east Texas 70 percent of acorns fell before maturity. The peak fall is generally in October and November, although the period may extend from September to February. Most acorns are eaten soon after fall but a few may be available until spring. Weevil damage is often heavy; up to 40 percent were damaged within 30 days after fall in east Texas. Although deer eat the weevil-damaged acorns, the nutritional value is lessened.

Late spring freezes often curtail mast crops.



## WHITE OAK

*Quercus alba* L.

### ALSO CALLED

Fork-leaf white oak, ridge white oak, stave oak.

A tree up to 150 feet tall with broad open crown.

**LEAVES** 5 to 9 inches long, glabrous, bright green above, paler below, midrib yellow with stout petiole; 7 to 9 rather deep lobes with rounded sinuses, apex 3-lobed, base wedge-shaped. Deciduous.

**FLOWERS:** male catkins hairy, about 3 inches long; female catkins 2- to 3-flowered, about 0.5 inch long.

**FRUITS** sessile or short-stalked, occur in pairs. About 0.75 inch long; bowl-shaped, cup encloses one-fourth of the nut.

**TWIGS** slender, glabrous. Leaf scars half-moon shaped.



## LAUREL OAK

*Quercus laurifolia* Michx.

### ALSO CALLED

Obtusa oak, swamp laurel oak, diamondleaf oak, laurel-leaved oak.

A tree up to 100 feet tall with dense round-topped crown.

**LEAVES** lustrous green above, pale below, 2 to 6 inches long, 0.5 to 1 inch wide. Apex is acute and base is wedge-shaped; margin entire or irregularly lobed. Persist until early spring.

**FLOWERS:** male catkins red, hairy, 2 to 3 inches long; female catkins short-stalked.

**FRUIT** very similar to that of water oak. Cup encloses about one-fourth of nut.

**TWIGS** reddish-brown to gray.



## WATER OAK

*Quercus nigra* L.

### ALSO CALLED

Possum oak, red oak, spotted oak.

A tree up to 80 feet tall. Round-topped, symmetrical crown.

**LEAVES** dull bluish-green above, pale below; 2 to 4 inches long, 1 to 2 inches wide. Variable in shape but mostly spatulolike; apex usually wedge-shaped, margin entire or lobed. Persist until late winter.

**FLOWERS:** male catkins 2 to 3 inches long; female catkins short-stalked.

**FRUIT** solitary or occasionally in pairs, short-stalked. Light brown to nearly jet black, with pubescent apex. About 0.5 inch long. Soucer-shaped pubescent cup encloses a third to one-half of nut.

**TWIGS** slender. Buds ovoid, acute, angled.



## WILLOW OAK

*Quercus phellos* L.

### ALSO CALLED

Pin oak, peach oak, swamp willow oak, red oak.

A tree up to 130 feet tall. In the forest it develops a long clear symmetrical bole and spherical crown; in the open, a short trunk and dense, broad or oval head.

**LEAVES** light green above, paler below, 2 to 5 inches long, 0.3 to 1 inch wide. Apex and base acute, margin entire or wavy. Seedling leaves may be sharply and irregularly lobed. Deciduous.

**FLOWERS:** male catkins 2 to 3 inches long; female are mostly solitary on short hairy stalks.

**FRUIT** resembles that of water oak but is more yellowish-brown and slightly smaller. Cup encloses about one-fourth of nut.

**TWIGS** reddish-brown and pubescent at first, gray and glabrous later. Buds ovate to lanceolate.



# ROSEBAY RHODODENDRON

*Rhododendron maximum* L.

A. B. Massey

Virginia Polytechnic Institute  
Blacksburg, Virginia

Rosebay rhododendron forms dense thickets under deciduous hardwood canopies, or in association with hemlock in moist soils near streams, at the base of cliffs, or on cool moist mountain slopes. It is probably most abundant in the Alleghenies.

A closely related shrub, Catawba rhododendron (*Rhododendron catawbiense* Michx.), is found on upper slopes and ridges, and is most common in the southern Blue Ridge on soils of igneous and metamorphic rock origin. In contrast to *maximum*, the flower buds are not surrounded by bracts, and it does not develop into dense thickets as an understory component.

Deer eat the leaves, flowers, and twigs, especially on the young plants. In the Appalachians south from Virginia and West Virginia, rhododendrons are only moderately palatable, but their abundance makes them very important in winter. They are especially valuable in heavily used ranges where more palatable species have been reduced or destroyed.

Rhododendrons made up 45 percent of the winter diet of deer taken on the Pisgah National Forest in North Carolina. Use during the rest of the year was light. It is browsed more conspicuously on lower elevations and in coves than on high sites, but this may be a function of herd distribution or availability of other browse. Where browsing has been so heavy that forage production is curtailed, sprouting may be induced by cutting the stems.

Twigs stripped of leaves (November through March) in Virginia contained: 3.9 percent crude protein, 4.1 ether extract, 4.2 ash, 22.6 crude fiber, and 65.2 percent nitrogen-free extract. The leaves of *maximum* reportedly contain andromedotoxin; heavy consumption may affect heart action, but deer appear less sensitive to the poison than domestic stock.

Ruffed grouse use the buds, and occasionally leaves and twigs. Deer mice and woods rats nip the leaves. Rhododendrons are widely planted ornamentals. Except for limited use of the figured burls for pipes, they have little wood value.

## ALSO CALLED

Great laurel, great rhododendron,  
white rhododendron, rosebay.





A shrub or small tree up to 30 feet tall.

**LEAVES** evergreen, thick. Dark green above, lighter and sometimes hoiry below, 3 to 10 inches long.

**FLOWERS** white or pinkish in large clusters. June-July. Flower buds large, conical, with several slender brocts around base.

**FRUIT** o many-seeded capsule about 0.5 inch long.



# BLACKBERRY, RASPBERRY, AND DEWBERRY

*Rubus* spp.

Dwight M. Moore

Arkansas Technological College  
Russellville, Arkansas

The genus *Rubus* includes many semiwoody, wild-growing shrubs known by the common names of blackberry, dewberry, and raspberry. Himalayaberry, boysenberry, and others are commonly cultivated but sometimes escape.

The members of the group are extremely variable and difficult to classify. Most produce semiwoody stems, either trailing or more or less erect to a height of three to ten feet. They are usually armed with short, straight or hooked spines or prickles on the stems and sometimes on the alternate compound leaves. Clusters of flowers, usually white, produce the characteristic aggregate fruits.

The white or light-colored undersides of their leaves distinguish raspberries from blackberries, while dewberries can be identified by their trailing habit of growth.

*Rubus* provides food and cover for many game species and songbirds. The fruits and succulent young stems and leaves are relished by deer in the South. Browse remains palatable

through the summer and generally ranks high as a fall and winter food. In some instances it has contributed up to 41 percent of the total winter forage. Production in Florida varied from 0.9 pound to 7.5 pounds per acre of browse, with 10 to 45 percent utilization by deer. Work in North Carolina showed that well-established *Rubus* growing in the open is resistant to deer browsing. Its scarcity or absence from fields abandoned five years or more may indicate extremely heavy deer use.

Black raspberry leaves in Florida yielded the following analysis: water 62 percent, crude protein 8, crude fat 6, and ash 7. The fruits were: water 81, crude protein 8, fat 8, and ash 3 percent.

Blackberries can be propagated from root cuttings and stolons and by dividing clumps.

Blackberries and raspberries often form thickets so dense that browsing by deer and cattle is inhibited, thus affording protection for hardwood seedlings on heavily used ranges.

## SPECIES MOST COMMON TO SOUTH

Allegheny blackberry (*R. allegheniensis* Porter), sharp-tooth blackberry (*R. argutus* Link.), highbush-blackberry (*R. ostryifolius* Rydb.)

Black raspberry (*R. occidentalis* L.).

Whiplash dewberry (*R. flagellaris* Willd.), southern dewberry (*R. trivialis* Michx.).



BLACKBERRY



DEWBERRY



RASPBERRY





RUBUS ALLEGHENIENSIS



R. ARGUTUS



R. OSTRYIFOLIUS

## BLACKBERRY

**LEAVES** usually green on both sides.

**FRUIT** receptacle becomes soft and juicy and comes off the plant integral with the drupelets.

**CANES** erect or arched, ridged or fluted, green or reddish-brown. First-year canes (primocanes) vigorous; leaves commonly having 5 leaflets; second-year canes (floricanes) produce short branches bearing leaves with 3 leaflets and flowers which develop fruit. Tips of canes may take root when they touch ground.



## RASPBERRY

**LEAVES** usually white or light-colored on underside.

**FRUIT** receptacle remains relatively dry and hard; aggregate of drupes comes away in a thimble-shaped unit.

**CANES** erect or arched, root at tip; smooth, cylindrical. Usually with whitish bloom that is easily rubbed off, leaving a purplish or light-colored stem. Primocanes vigorous; leaves commonly with 3 leaflets; floricanes similar to blackberry, except far color and less fluting.



R. OCCIDENTALIS



R. FLAGELLARIS



R. TRIVIALIS

## DEWBERRY

**LEAVES** same as blackberry.

**FRUIT** same as blackberry.

**CANES** usually trailing, send up floral branches a few inches high which bear flowers and fruit.



## AMERICAN ELDER

*Sambucus canadensis* L.

**Donald J. Hankla**

*North Carolina Wildlife Resources Commission  
Raleigh, North Carolina*

American elder is found on stream banks and in major bottoms and sometimes on moist sites in upland woods. It occurs in full sun but is more common in the understory, provided that the canopy allows some direct light to enter.

Deer preference varies from low to medium. Elder is readily eaten in West Virginia, Pennsylvania, Wisconsin, and New York. In the Piedmont and Gulf Coast it generally has a lower rating, though in Piedmont Georgia it was used regularly and heavily in September even where honeysuckle and greenbrier were abundant. Its use has also been reported in Louisiana. Browsing is seldom severe enough to retard normal growth.

Foliage is available from spring until frost. Assays at North Carolina State College and Louisiana State University show the crude protein content of leaves, stems, and fruits to be 18, 7, and 14 percent, respectively. These levels are above those of most other deer browse. New growth tastes bitter and contains a glucoside that is sometimes fatal to cattle and sheep; the older growth has some forage value.

Although the fruit is readily eaten by many game and song birds, its value for wildlife is limited because plants are sparsely distributed. Berries are sought locally for making wines, jellies, and pies. Limited use is made of the plant as an ornamental.

### ALSO CALLED

Elder, sweet elder, common elder,  
blackberry elder.



**Many-stemmed shrub overaging 7 feet tall.**

**FLOWERS** white in convex cymes up to 10 inches across. June-July.

**STEMS** dotted with corklike lenticels, pith white; buds medium-sized, conical, and somewhat depressed.

**LEAVES** deciduous; upper surface lustrous bright green, lower surface paler; 4 to 12 inches long.

**FRUIT** berry-like in clusters. Drupe deep purple, 0.15 to 0.25 inch in diameter. August and September.



# SASSAFRAS

*Sassafras albidum* (Nutt.) Nees

**Robert G. Leonard**

*Arkansas Game and Fish Commission  
Mountain View, Arkansas*

Sassafras occurs in rich, dry, sandy soils, and is generally abundant throughout most of its range. It suffers from winter killing in the North, but is found at altitudes of 4,000 feet in the southern Appalachians. It is a vigorous invader of abandoned land but relatively short-lived and transitory in wooded areas.

Deer browse the twigs in winter and the leaves and succulent growth during spring and summer. Palatability, although quite variable, is considered good throughout the range. In east Texas, sassafras is highly preferred; and in Pennsylvania and West Virginia it is classed as an important source of food. In Ontario, it is rated as having medium palatability with heavy browsing. In Arkansas, the plants re-

ceive moderate to heavy use during the growing season.

The fruit is eaten by songbirds, wild turkey, bobwhite, and raccoons, squirrels, and other mammals.

The orange wood is durable, coarse-grained, and light, but is neither hard nor strong. It has been used for cooperage, buckets, boats, posts, and furniture. A tea is made from the outer bark of the roots; an extract of the bark is used as an orange dye for wool; the oil is included in some soaps. When invading pastures and old fields sassafras is considered a weed, but even here its wildlife value often justifies its existence.

## ALSO CALLED

Ague-tree, cinnamon-wood, smelling-stick, saloop, gumbo-file.





A tree up to 90 feet tall.

**LEAVES** alternate, deciduous, aromatic, 3 to 5 inches long. Of three forms: three-fingered, thumb-and-mitten, and egg-shaped.

**FLOWERS** greenish-yellow. Loose open clusters appear before leaves unfold.

**TWIGS** bright green or reddish-brown, shiny, and spicy. Buds usually solitary.

**BARK** dark reddish-brown. Old trunks have deep, irregular fissures.

**FRUIT** a blue spicy drupe 0.5 inch long, borne erect on a bright red club-shaped stalk. August to October.



# GREENBRIERS

*Smilax* spp.

**Phil D. Goodrum**

*Bureau of Sport Fisheries and Wildlife, U. S. Fish and Wildlife Service  
Nacogdoches, Texas*

Greenbriers are a group of thorny, woody vines, all more or less alike in appearance. They retain leaves most of the year. The flowers are pale green and very small; fruits are berries.

There are 11 U. S. species, 10 of which occur on the Gulf and Atlantic Coasts. The five discussed here are widely distributed in both dense and cut-over forests, in swamps and abandoned fields, and along fence rows. They tolerate shade but are most luxuriant in the open.

Common greenbrier, the most widely distributed species, is especially abundant in low, damp flatwoods. Laurel greenbrier is largely confined to bay and swamp margins and banks of marshy streams, but occasionally is found on upland sites. Lanceleaf greenbrier is most abundant in the lower Coastal Plain along edges of small streams, swamps, and ditches in well drained but not dry soil. Cat greenbrier and saw greenbrier grow in a variety of soils and moisture conditions.

Greenbriers are present in all stages of plant succession. Rhizomes may persist for years, even when the canes have been killed by fire or by disturbance of the ground. Indeed, disturbance may scatter the rhizomes and thus multiply the plants. Canes live from 2 to 4 years and produce flowers after the first year—usually from annual shoots on the upper parts of the cane.

Greenbriers are considered by many to be the most important group of deer food plants in the South. The fast-growing green canes and tender shoots are very palatable, and the leaves are relished all year. Laurel greenbrier is the most sought after; saw greenbrier is least preferred.

The growth habit and fleshy root system make them very tolerant to deer browsing. Rhizomes usually produce new canes annually. These grow quickly but if the tips are nipped off new branches form at one or several re-

maining nodes. Thus, browsing helps in making the growth available.

Ten years of heavy deer use in Mississippi failed to kill several tagged specimens. Two years of moderate browsing killed the above-ground stems of laurel greenbrier but these were replaced by more stems from the underground tubers and rootstocks. Cat greenbrier best withstands heavy deer pressure, because with continued use it tends to form a dense hedge of stiff stems. About 50 to 60 percent of the annual growth of greenbriers may be eaten without mortality of roots.

Cattle compete with deer for the stems and leaves.

In east Texas greenbriers as a group contained nearly twice as much crude protein in winter (11 percent) as the average for several other browse plants. Furthermore, protein decreased only slightly from spring to winter, while in other species it dropped 50 percent.

When canes grow out of reach of deer, forage conditions can be improved by a prescribed burn. The regrowth is immediately available and has more crude protein than older stems.

Fruits are eaten by some birds and the young stems are relished by the swamp rabbit.

Common greenbrier may overburden young trees, but the loosely twining vines of other species do not dominate the ground completely enough to inhibit the growth and development of tree seedlings. The spiny stems are a nuisance to woods workers.

Greenbriers can be propagated from rootstocks but canes may not appear until the second year after planting. Lanceleaf will not spread from the planting point except by dissemination of seed, because it has tubers instead of rhizomes.

Underground parts of laurel and lanceleaf greenbriers are high in starch content and were valued by the Indians as food. The vines are extensively used for decoration and sometimes the young shoots are eaten as greens.

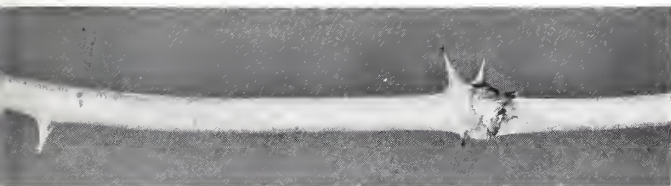


# SAW GREENBRIER

*Smilax bona-nox* L.

## ALSO CALLED

China brier, bullbrier, fiddle-leaf greenbrier, sawbrier.



A straggling to climbing vine.

**LEAVES** tardily deciduous. Usually thick and often blotched with white; 1.5 to 4.5 inches long, 0.7 to 3 inches wide. Margins and main veins usually prickly.

**FLOWERS** April to June.

**FRUIT** a black berry with a bloom, about 0.25 inch long, single seed. Pulp stretchy. October to November.

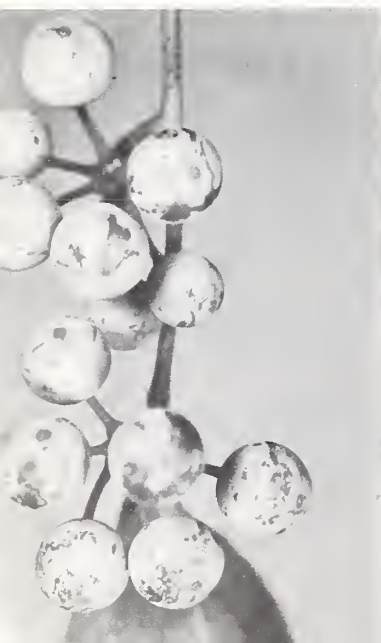
**CANE** 4-angled or round, zigzag in upper reaches. Main branches with stiff, flattened, black-tipped spines clustered at the nodes.

**UNDERGROUND STEMS** are woody tubers, single or in a compound mass up to 6 inches across. Roots with short, resinous-tipped spines.



# CAT GREENBRIER

*Smilax glauca* Walt.



## ALSO CALLED

Sawbrier, wild sarsaparilla, stretch greenbrier, glaucous-leaf greenbrier.

A slender, climbing vine.

**LEAVES** tardily deciduous, 1.5 to 4 inches long, 1.25 to 3 inches wide. White or glaucous on the underside.

**FLOWERS** May to June.

**FRUIT** a black berry, with a bloom. Ripens in first year. Seeds 2 or 3.

**CANE** green or mottled brown. Lower part thickly set with slender, slightly recurved, needle-like spines between the nodes.

**UNDERGROUND STEMS** consist of tubers and rhizomes. Tubers 0.5 to 2 inches thick, not spiny; rhizomes with small prickles between nodes.

# LAUREL GREENBRIER

65

*Smilax laurifolia* L.

## ALSO CALLED

Laurelleaf greenbrier, bamboo-vine, blaspheme-vine.



A stout, high-climbing vine.

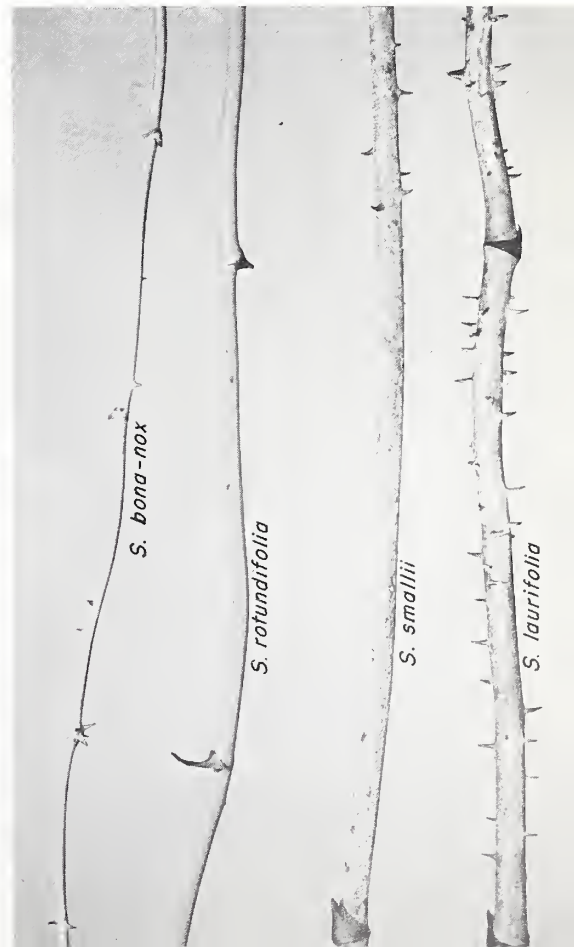
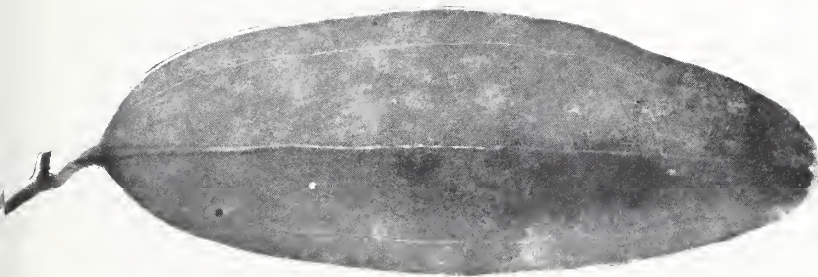
LEAVES 2 to 6 inches long, 0.5 to 1.5 inches wide. Evergreen, thick and leathery, with 3 prominent veins.

FLOWERS July to August.

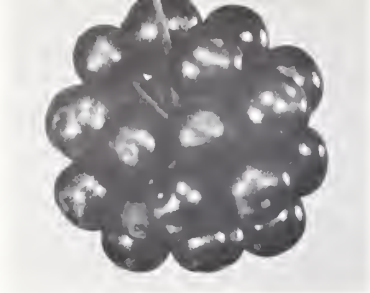
FRUIT a shiny black berry, in clusters of 5 to 25. Matures in October, second season after flowering.

CANE mostly round, up to 0.5 inch thick. Spines abundant on lower part, flattened but stout, up to 0.5 inch long. Usually no spines on joints.

UNDERGROUND STEMS a hard and knotty thickened mass with reddish surface.







## COMMON GREENBRIER

*Smilax rotundifolia* L.

### ALSO CALLED

Common bullbrier, horsebrier, sawbrier, Devil's-hop-vine, round-leaf greenbrier.



A tough, stout woody vine climbing up to 20 feet and forming tangled thickets.

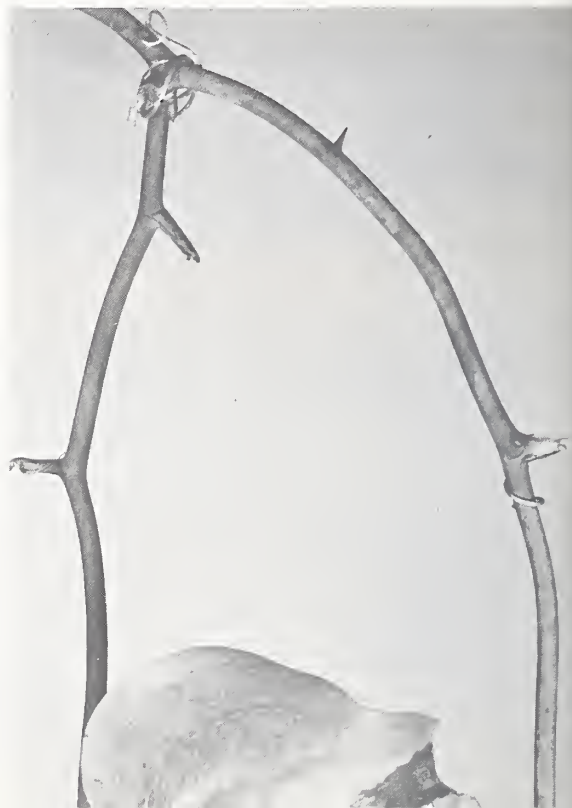
**LEAVES** 2 to 6 inches long, 1 to 6 inches wide. Mostly round and smooth, tips abruptly pointed. Green both sides, shiny beneath. Tordily deciduous.

**FLOWERS** March to May.

**FRUIT** a black berry with a bloom. Matures in one year. Seeds 2 or 3.

**CANE** round or 4-angled, green at all ages. No spines on nodes.

**UNDERGROUND STEMS** long, slender, and glabrous. No tubers.





## LANCELEAF GREENBRIER

*Smilax smallii* Morong

### ALSO CALLED

Thornless smilax, coral greenbrier, bamboo-vine.



A stout high-climbing vine that grows up for many feet without branching.

**LEAVES** 2 to 5 inches long, 0.75 to 2 inches wide, mostly lance-shaped. Deep green and shining on upper surface, five veins, rarely seven. Evergreen. Young leaves are smaller than adult leaves and have minute blunt teeth on margins.

**FLOWERS** jasmine-like odor. April to July.

**FRUIT** a berry up to 0.25 inch thick, in clusters. Maroon to blackish-red when ripe, usually 2 seeds. Matures second year in June.

**CANE** dark-greenish or reddish-brown, spotted with gray. Spines few and scattered, flattened, often recurved, about 0.2 inch.

**UNDERGROUND STEMS** tuberous, may reach a length of 2 feet and weigh up to 16 pounds; young tubers firm like an Irish potato.



## COMMON SWEETLEAF

*Symplocos tinctoria* (L.) L'Her.

**Dan Speake**

*Alabama Cooperative Wildlife Research Unit  
Auburn, Alabama*

Common sweetleaf grows in sun or shade, frequently forming small thickets under pines. It occurs on a wide variety of sites in the Coastal Plain, and inland up to elevations of approximately 3,500 feet.

Use by deer is variable. In the longleaf pine belt of Mississippi and Louisiana, it is among the most important browse. In east Texas, it ranks as moderately palatable, with greatest use in spring. In contrast, no sweetleaf was found in the stomachs of 195 deer from west-central Alabama and 19 deer from the Bankhead National Forest of northwestern Alabama. In the Choccolocco Mountains of northeastern Alabama, sweetleaf was browsed lightly in summer and heavily in winter. In the Chattahoochee National Forest in northeastern Georgia, it was very rarely taken. In the mixed oak type of the Pisgah National Forest in North Carolina, it is considered moderately palatable.

Utilization of more than half of sweetleaf

forage by deer in east Texas indicated an overstocked range in which more palatable deer food plants were decreasing. Cattle relish sweetleaf and overbrowse it even when herd numbers are low.

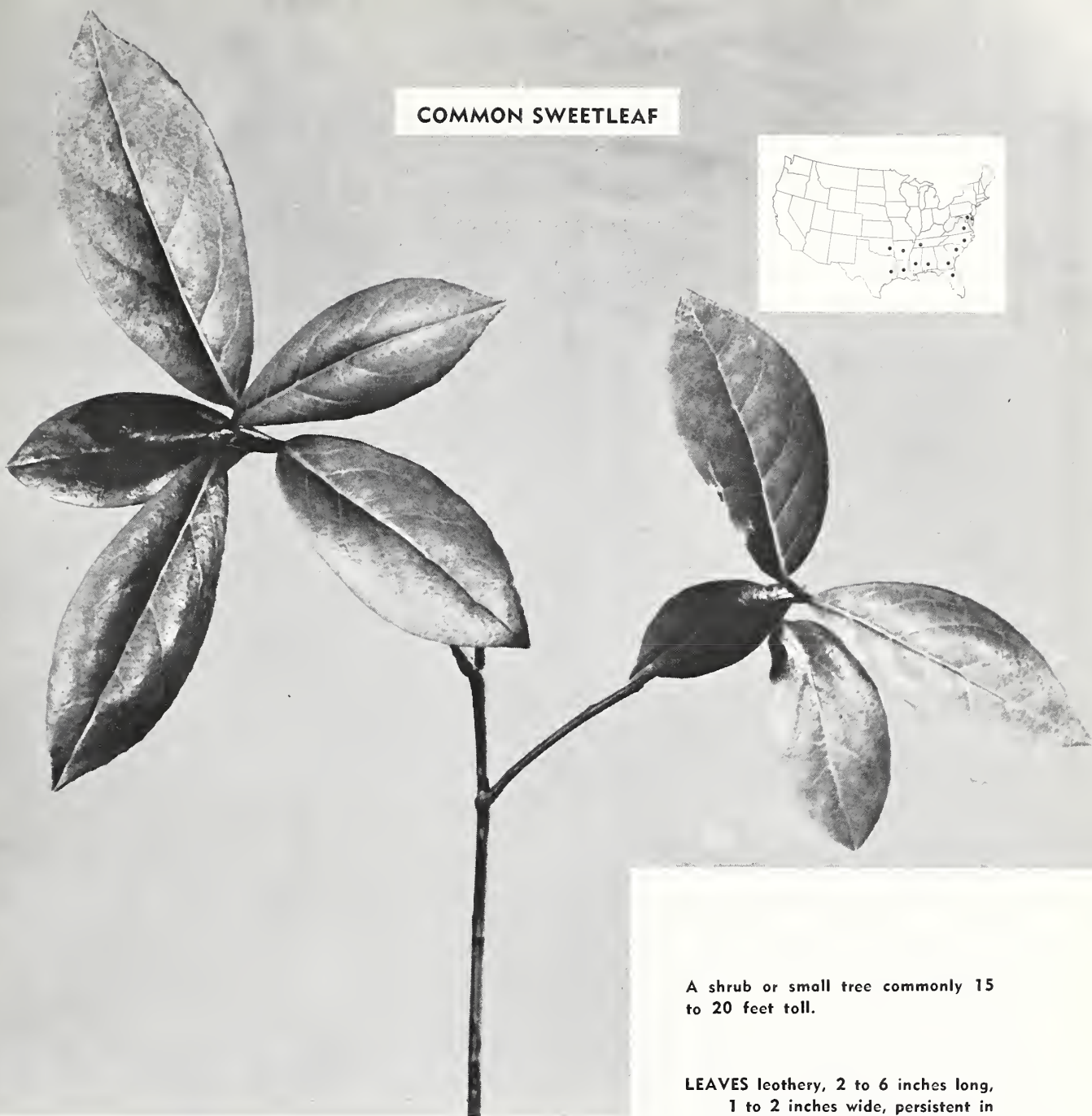
Burning increases both the quality and quantity of sweetleaf browse. On unburned range in east Texas, crude protein varied from 17 percent in spring to 8 percent in winter; after burning, these percentages were 20 and 9. Phosphorus ranged from 0.50 percent in spring to 0.15 in winter; burning increased these percentages to 0.64 and 0.20. In one case, burning doubled the available browse by stimulating new sprout growth.

Sweetleaf is of little importance economically, though the leaves and bark are sometimes used to make a yellow dye. It is often grown as an ornamental, but is seldom handled by nurserymen.

### ALSO CALLED

Sweetleaf, horse-sugar, yellow-wood, sweetbay, wild laurel.

## COMMON SWEETLEAF



A shrub or small tree commonly 15 to 20 feet tall.

**LEAVES** leathery, 2 to 6 inches long, 1 to 2 inches wide, persistent in the South.

**FLOWERS** fragrant, small yellowish-white, in axillary clusters. March to May.

**FRUIT** orange-brown drupe, 0.25 to 0.5 inch long. Early autumn.

**TWIGS** upcurved terminally, buds conical and obtuse, leaf scars low and horizontal.





# BLUEBERRIES

*Vaccinium* spp.

Edward E. Dale, Jr.

University of Arkansas  
Fayetteville, Arkansas

Blueberries are a widely distributed group of shrubs or small trees. The variously subdivided genus *Vaccinium* is not well understood taxonomically. Many hybrids occur among species with overlapping geographic ranges. Blueberries have somewhat four-angled branchlets, alternate evergreen or deciduous leaves, and white, greenish, or rose-colored flowers that are generally drooping and somewhat bell-shaped. The fruit is a globose, 4- or 5-celled berry with a persistent calyx on the flattened end.

Tree sparkleberry is found in sandy or rocky woods, thickets, and clearings. It is one of the few blueberries which grow in slightly alkaline or neutral soils.

Ground blueberry usually occurs in large colonies on sandy areas.

Dryland blueberry and common deerberry are usually found in colonies, often in nearly pure stands. They generally grow on well-drained, acid soils in dry, open pine or oak woods, along rocky ledges, and occasionally in abandoned fields.

Blueberries grow best in full sunlight. In the Coastal Plain, fire may increase blueberry growth but a decrease after fire has been reported in other areas.

In some areas they are unpalatable; in others they are choice deer food. Dryland blueberry

ranks as a second- or third-choice plant in the western Gulf Coast. In the flatwoods and pine-oak sites of Florida, utilization of several blueberry species ranged from 10 to 38 percent.

A summer survey in the Choccolocco Wildlife Management Area of northeastern Alabama, where dryland blueberry comprised 72 percent of all shrubs, showed that 54 percent of the annual growth was removed. Browsing was greatest in April and May, but continued during winter. Availability and utilization were highly variable in different years.

Blueberries are browsed very heavily in central Pennsylvania. Where the overstory is cut, young shoots are closely cropped each year. In Wisconsin, blueberries are considered as a second-choice deer food in winter. In New Jersey, they are grazed lightly throughout the year; cultivated plants are used heavily.

The fruits are taken by bear, opossum, fox, raccoon, skunk, and many birds and rodents. Cottontail rabbits, and to a lesser extent some domesticated animals, eat young twigs and leaves. The browse is of negligible value to sheep and cattle.

Blueberries are eaten extensively by humans. Several large-fruited species are cultivated. Others are used as ornamentals. The hard and very close-grained wood of tree sparkleberry is sometimes used for tool handles.

## COMMON DEERBERRY

*Vaccinium stamineum* L.

ALSO CALLED

Squaw huckleberry, buckberry.



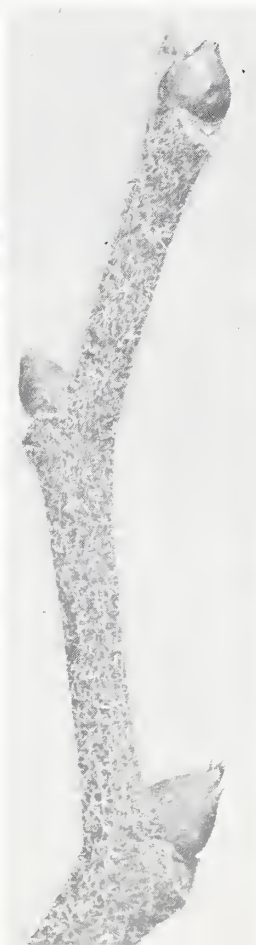
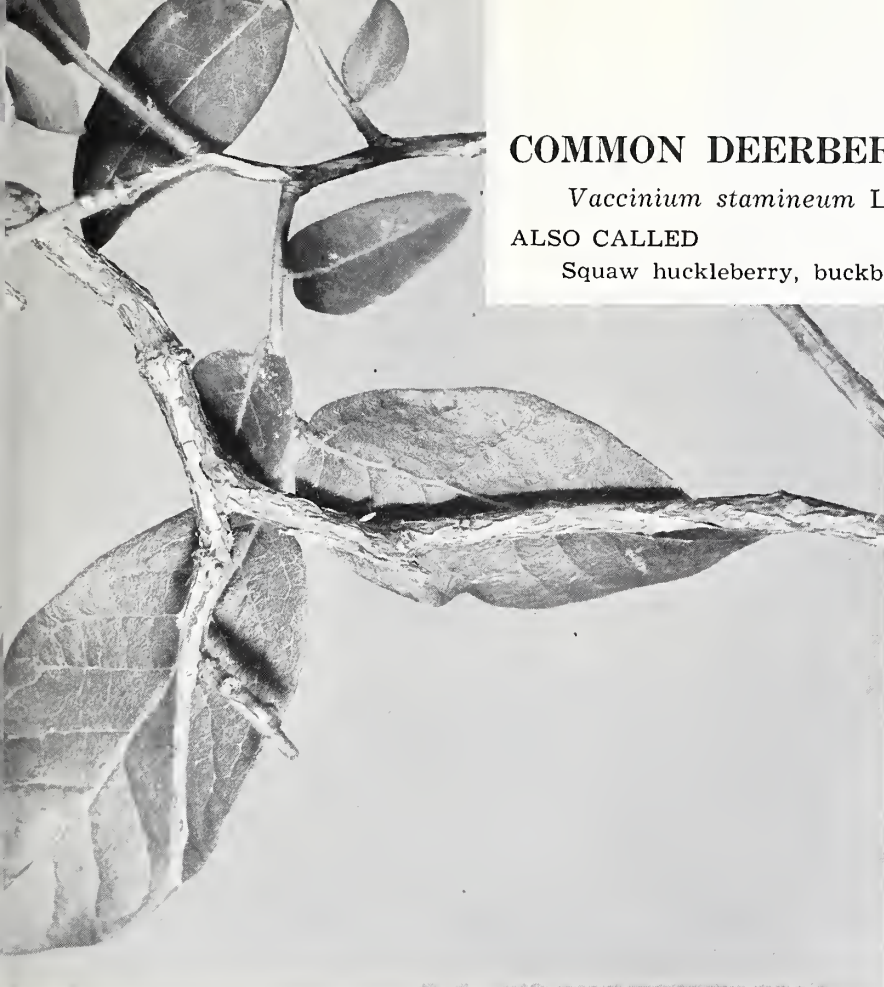
Diffusely branched shrub rarely more than 6 feet tall.

**LEAVES** rounded at base, 1.2 to 3.5 inches long. Deciduous.

**FLOWERS** greenish-white to purple on specialized flowering branches subtended by leafy brocts. April to June.

**FRUIT** green or yellowish globose berry about 0.4 inch in diameter. Usually drops after maturity in late July to September.

**TWIGS** pubescent when young; bark becomes ploty and fissured on old plants.







## TREE SPARKLEBERRY

*Vaccinium arboreum* Marsh.

### ALSO CALLED

Farkleberry, whortleberry, tree-huckleberry, winter-huckleberry.



## GROUND BLUEBERRY

*Vaccinium myrsinites* Lam.

### ALSO CALLED

Evergreen blueberry, Florida evergreen blueberry.



## DRYLAND BLUEBERRY

*Vaccinium vacillans* Torr.

### ALSO CALLED

Blueridge blueberry, low bilberry, lowbush blueberry, sugarhuckleberry.







### TREE SPARKLEBERRY

A shrub or small crooked tree up to 30 feet tall.

**LEAVES** 1 to 3 inches long, tips rounded, margins turned inward. Deciduous, becoming evergreen southward.

**FLOWERS** white on long slender stalks in loose, leafy-bracted clusters.

**FRUIT** block, about 0.23 inch in diameter, with dry pulp and hard stonelike seeds. Ripens in August to October but often remains on plant over winter.



### GROUND BLUEBERRY

Low, much-branched shrub up to 3 feet tall.

**LEAVES** 0.3 to 0.8 inch long. Leathery, evergreen. Underside usually glandular.

**FLOWERS** white to pink in umbel-like clusters.

**FRUIT** dark, sometimes covered with bloom, about 0.23 inch in diameter. May.



### DRYLAND BLUEBERRY

A low shrub 0.5 to 3 feet tall.

**LEAVES** V-shaped at base, 0.75 to 1.75 inches long. Deciduous, leathery when mature.

**FLOWERS** greenish to purplish on ends of branchlets or from old axils. Appear before leaves are fully expanded.

**FRUIT** blue to black globose berry, 0.2 to 0.3 inch in diameter. June to September.

**TWIGS** brown or greenish, often crooked.



# VIBURNUM

*Viburnum* spp.

**Herman L. Holbrook**

*Cherokee National Forest  
Cleveland, Tennessee*

Viburnums are valuable to wildlife chiefly for their fruit, a 1-seeded drupe with a flat stone and thin oily flesh. The four species described here also furnish some browse.

Viburnums have showy, umbrella-shaped clusters of small white or pink flowers that appear in spring or early summer. The simple and deciduous leaves are opposite; the stem at the point of attachment is marked by a characteristic line. Mature fruit is red or blue-black, round or slightly flattened, and about one-quarter inch in diameter. The umbrella-shaped fruit clusters usually contain one to two dozen drupes. Species reproduce vegetatively and by seed.

Viburnums occur most often on moist, well-drained sites. Hobblebush, mapleleaf viburnum, and southern arrowwood are all found under well-stocked hardwood stands, but these and other species are also capable of dominating low vegetation in openings. Hobblebush and witherod are usually at elevations above 4,000 feet.

The foliage is usually within reach of deer. Twigs and leaves are eaten from spring through fall and occasionally in winter. Though little used in the Appalachians, southern arrowwood was browsed to about the same degree as green-briers in the Cumberland Plateau of Tennessee.

As the plants sprout and layer readily, they normally thrive with moderate browsing. Hobblebush and witherod have been observed to withstand repeated browsing by cattle. Removal in excess of one-half the current annual growth did no serious damage.

The fruit is available from late summer through fall and is readily taken by songbirds, grouse, quail, squirrels, and chipmunks as well as deer. Seep crops are heaviest in the open.

Their showy flowers and colorful fruit make them desirable as ornamentals, so that many varieties have been developed for landscaping purposes. Aphids and defoliating insects sometimes attack the plants, but seem not to damage them seriously.

## MAPLELEAF VIBURNUM

*Viburnum acerifolium* L.

### ALSO CALLED

Arrowwood, possumhaw, squash-berry, dockmackie.

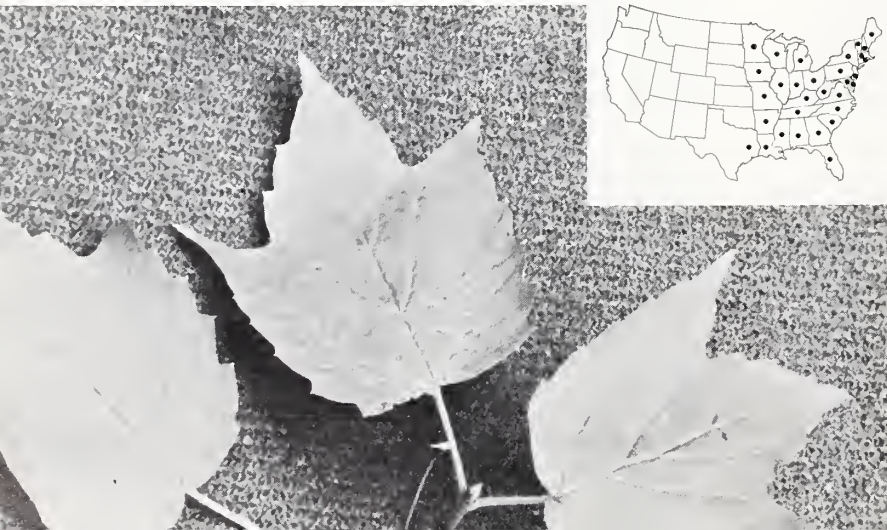
A shrub 2 to 6 feet tall, often forming thickets.

**LEAVES** 1.25 to 5 inches wide or long. Lateral veins continuous to margins. Lower leaf surface copiously dotted.

**FLOWERS** in cymes 0.75 to 3.5 inches wide.

**FRUIT** a flattened drupe with shallow grooves on each side. July to October.

**TWIGS** pubescent, pith narrow. Terminal buds acute with 2 or 3 pairs of visible scales.





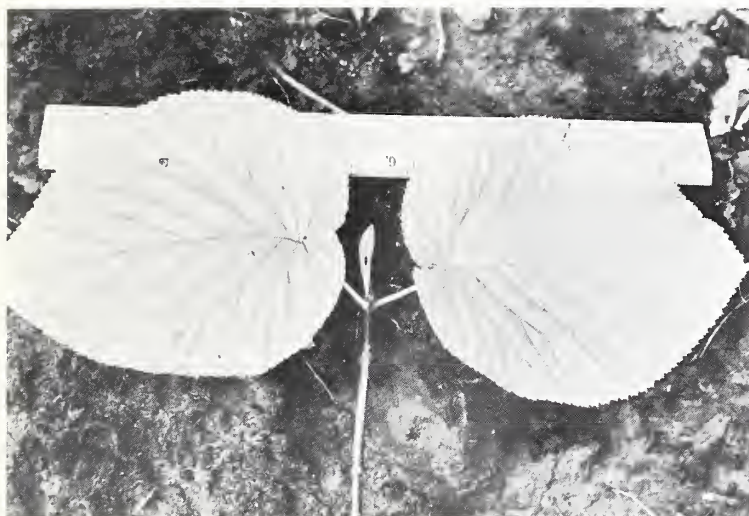
# HOBBLEBUSH

*Viburnum alnifolium* Marsh.

## ALSO CALLED

Witch-hobble, tangle-legs, moose-wood.

75



Straggling shrub 3 to 15 feet tall.

**LEAVES** 3.5 to 8 inches long and nearly as wide. Scurfy on underside. Lateral venation pinnate, bronching several times, ending at serrations of leaf margin.

**FLOWER** 1 to 2 inches wide, essentially without stalks.

**FRUIT** clusters 1 to 2 inches wide, drupe flattened on one side, grooved on all faces. August to October.

**TWIGS** scurfy. Buds large, naked, scurfy; terminals often exceed 1 inch.







## WITHEROD

*Viburnum cassinoides* L.

ALSO CALLED  
Wild-raisin.

A shrub 3 to 12 feet tall.

LEAVES 1 to 6 inches long, lateral veins form a network. Underside of petiole and midrib brown-speckled.

FLOWERS in stalked cyme, ill-scented, 1 to 4 inches wide.

FRUIT in stalked clusters. Drupe flattened on both sides. September-October.

TWIGS with tight, light, gray bark. Lenticels prominent, pith continuous, white to rusty. Buds obovate, elongated, bright rusty color.

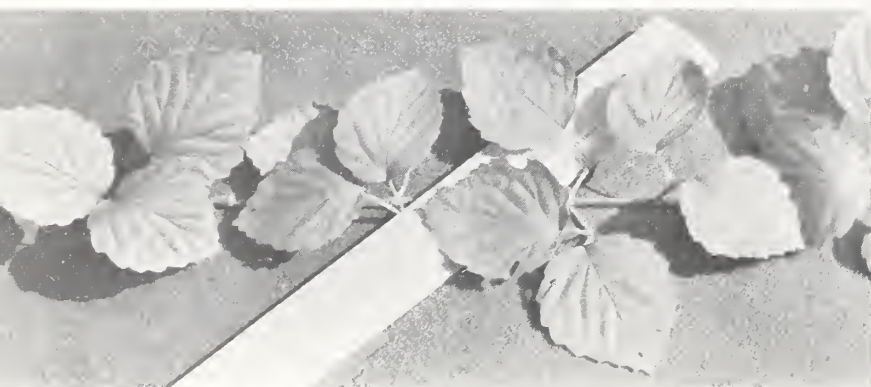


## SOUTHERN ARROWWOOD

*Viburnum dentatum* L.

ALSO CALLED

Arrowwood viburnum, mealy-tree, withewood.



A shrub 3 to 15 feet tall.

LEAVES 1 to 4.5 inches long, veins continuous to margin. Many single or tufted hairs at fork of branched veins on the under surface.

FLOWER cymes 1.25 to 4.5 inches wide.

FRUIT a drupe with shallow grooves on one side. August to November.

TWIGS globose. Pith continuous and white to rusty in color. Terminal buds obovate with 2 or 3 pairs of visible scales.

## SUMMER GRAPE

*Vitis aestivalis* Michx.

A. B. Massey

Virginia Polytechnic Institute  
Blacksburg, Virginia

Summer grape is described here as a representative of several species in southern forests. It is common in woods, field borders, thickets, and waysides, often burdening shrubs and climbing high into trees.

Deer browse the vines consistently and heavily in spring and moderately in summer. During January and February, they occasionally eat large amounts of fallen leaves, apparently for roughage. The degree to which it is taken from late winter through early summer is an indicator of browsing pressure.

The fruits remain on the vines after ripening, becoming wrinkled and raisin-like, and furnishing a valuable winter food for wildlife, especially turkey and grouse. Songbirds are also heavy consumers of the fruit. Analysis of fresh fruit yielded: water 81 percent, crude protein 1.4, fat 1.4, carbohydrate 14.9, fiber 0.5, minerals and vitamins 0.8.

Grape can be propagated by layering. The species is dioecious, and at least one staminate plant should be placed in the vicinity of three or four pistillate plants.

### ALSO CALLED

Pigeon grape, bunch grape.

A vigorous vine, high climbing by tendrils.

LEAVES alternate, deciduous, 2 to 8 inches long or broad. Rusty pubescence on the lower surface.

FLOWERS small in elongated semi-erect clusters, dioecious. May to July.

FRUIT a persistent berry about 0.25 inch in diameter. September to October.

TWIGS brown, leaf and tendril opposite at each node, but third node has no tendril.



## TAXONOMIC REFERENCES

FERNALD, M. L.

1950. GRAY'S MANUAL OF BOTANY. Ed. 8, 1,632 pp., illus. N. Y.

GLEASON, H. A.

1952. THE NEW BRITTON AND BROWN ILLUSTRATED FLORA OF THE NORTHEASTERN UNITED STATES AND ADJACENT CANADA. Vol. 1, 482 pp., Vol. 2, 655 pp., Vol. 3, 595 pp., illus. N. Y.

KELSEY, H. P., and DAYTON, W. A.

1942. STANDARDIZED PLANT NAMES. Ed. 2, 675 pp. Harrisburg, Pa.

LITTLE, E. L., JR.

1953. CHECK LIST OF NATIVE AND NATURALIZED TREES OF THE UNITED STATES (INCLUDING ALASKA). U. S. Dept. Agr. Agr. Handb. 41, 472 pp.

SMALL, J. K.

1933. MANUAL OF THE SOUTHEASTERN FLORA. 1,554 pp., illus. N. Y.

VINES, R. A.

1960. TREES, SHRUBS, AND WOODY VINES OF THE SOUTHWEST. 1,104 pp., illus. Austin, Texas.

The order of preference in checking scientific nomenclature and plant descriptions was Little, Fernald, Gleason, Vines, and Small, respectively. Preferred common names were from Little and from Kelsey and Dayton.





1022312935

NATIONAL AGRICULTURAL LIBRARY



1022312935